THE IRON TRADE REVIEW

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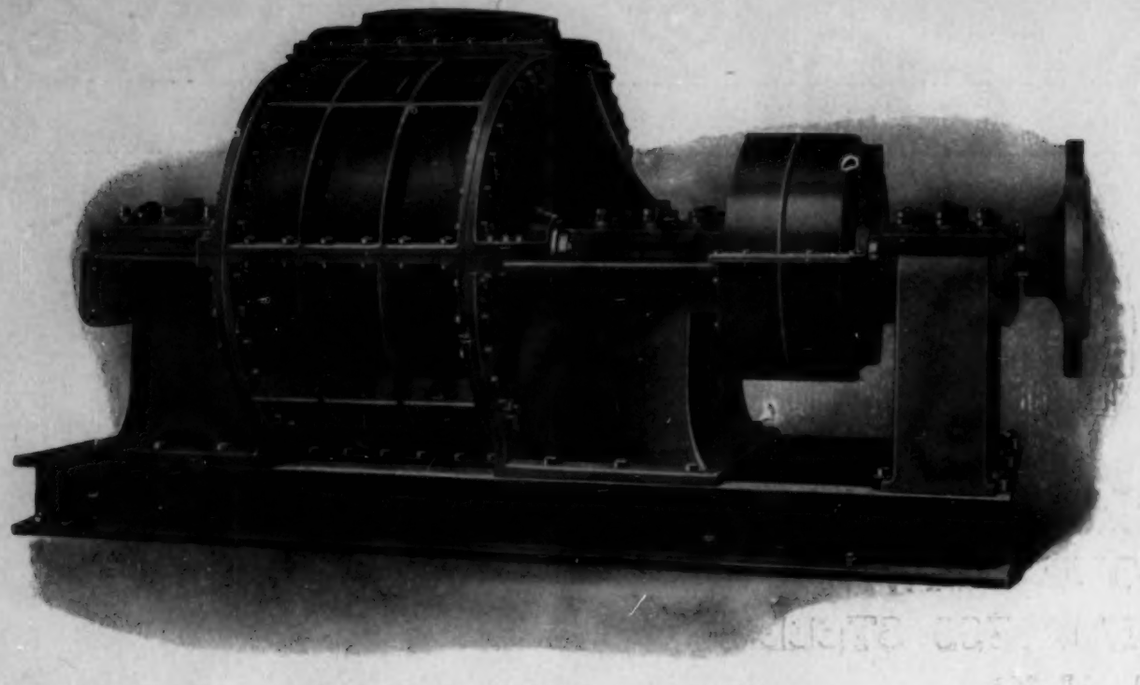

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THE IRON TRADE REVIEW

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Conservative Policy is Adopted

Leading Companies Becoming More Careful About Credits—Price Movement Continues Upward—Ore Contracts for Large Tonnages

WHILE prices continue to advance rapidly and demand is as strong as ever, the necessity for conservative action is being shown by leading companies inaugurating a more rigid policy in regard to credits and by some manufacturers in declining to quote on many products until they are able to reduce, to some extent, immense tonnages of unfilled orders on their books.

Iron Ore

The advance in the price of Lake Superior iron ores of $1.50 a ton, making the quotations on Mesabi ores the highest that have ever prevailed and those on old range ores the highest in more than 25 years, has been followed by the converting of reservations for immense tonnages into contracts by leading consumers in the central west. This has also been done in the east, to some extent, but in that part of the country there is a disposition to await developments, as prices of local eastern ores are expected to be lower than those of the Superior ores.

Ferro Manganese

The one exception to the story of advancing prices is furnished by ferro-manganese. The success of domestic manufacturers has caused foreign makers to consider the advisability of reducing prices, as it is understood that the sales which have already been made by domestic companies are considerably below the usual quotation of $165, delivered.

Pig Iron

The prices of bessemer and basic pig iron in the valleys have advanced almost, if not quite, $5 per ton during the past week, while other grades of pig iron in that district and throughout the east and central west have been marked up rapidly and it is difficult in many cases to determine what prevailing prices are. The sales of the week have included about 100,000 tons in the New York district, 20,000 to 25,000 tons of basic in Alabama, at $20 to $21, furnace; 25,000 tons of all grades at Buffalo; 34,000 tons of basic by a valley furnace to an eastern Pennsylvania consumer at $30, valley, and numerous sales in the Philadelphia district. One Cleveland firm has sold 100,000 tons of various grades during the month and is considering inquiries for 45,000 tons. The advance in the price of Superior iron ores means an increase of about $3 per ton in the cost of manufacturing pig iron.

Coke

The scarcity of coke continues to cause serious embarrassment to consumers, especially to foundries, many of which are operating from hand to mouth. A Cleveland foundry was compelled to pay $10.35 per ton for five carloads of coke for prompt delivery.

Warehouse Business

Warehouse prices in leading centers have again been advanced $5 per ton on shapes, plates and bars, while in some cases heavier advances have been made on sheets. The business which warehouses are able to do is limited by their ability to replenish their stocks.

Cast Iron Pipe

Although prices of cast iron pipe had already been advanced $6 during the month at Chicago, another advance of $2 has been made and quotations have also been marked up $2 in eastern territory. Another advance of $3 is announced on wire products and wire nails are now quoted at $3 per keg, the highest price which has prevailed since 1900.

Railroad Buying

The buying of rails for 1918 delivery has proceeded at an active rate. Orders by western roads placed with the Corporation amount to 150,000 tons. The New York Central has closed for about 150,000 tons, the Erie has purchased from 40,000 to 50,000 tons, and many inquiries, including one for 205,000 tons for the Pennsylvania, are pending. Car orders for November amount to from 35,000 to 40,000, of which fully 10,000 were placed last week. Many orders for locomotives also were placed.

THE OPEN HEARTH

The New Iron Ore Prices

THE starting of the buying of iron ore for 1917 delivery at an advance of $1.50 over the 1916 prices carries the mind back to Dec. 15, 1899, when the buying movement was started on a basis of $5.50 for old range bessemer, an advance of $2.50 over the price for 1899. The 1900 prices were higher than any of later years until those just announced for 1917. After the ore buying started in 1899, *The Iron Trade Review* remarked: "While it is not to be expected that the scramble of last spring, when prices were about $2.50 a ton lower, will be repeated, large contracts have been entered into in the past few days and in the case of some large producers the bulk of their output for 1900 has been sold." A week later, *The Iron Trade Review* stated that it was estimated that 75 to 80 per cent of the merchant ore from old range properties had been taken up, but that in a good many cases buyers had contracted for only such ore as they would need up to Jan. 1, 1901, "preferring to know what the pig iron market is likely to do in the second half of next year before making up their minds to pay the present price for ore for the early months of 1901." At that very time, there were rumblings of coming disaster on the stock exchange and *The Iron Trade Review* of Dec. 28, 1899, referred to the sudden and extraordinary slump in Wall street, the week before, as the "prosperity panic". In the same issue, the late Archer Brown, of New York, discussed the Wall street panic and said in part:

"With labor everywhere well employed, with the farms prospering as never before, with the railroads overburdened with traffic, with our exports of merchandise increasing in spite of high prices, with a balance of trade still over $600,000,000 in our favor, with a sound currency assured by congressional action, with the Philippine war near its end, with new markets opening to us everywhere, and with 80,000,000 of people just emerging from a long period of economy and restricted action, and full of hope and confidence and vigor, it is safe to say that the year just opening will make pessimism and distrust a risky line of policy to pursue."

During the boom of 1899, prices had expanded rapidly, as a glance at the annual price chart of *The Iron Trade Review* shows in a striking manner and the ore men felt justified in making the advance in ore prices, but generally, business conditions followed the lead of Wall street and there was a decided slump in 1900, with prices striking very low points about the middle of the year. Although in some respects the description of conditions given by Mr. Brown 18 years ago applies to those of today, there is absolutely no reason for believing that next year will repeat the history of the year 1900. The war is almost universally admitted to be the greatest factor in present prosperity, and all indications that the terrible conflict will last a year longer and in all probability for two or three years. The advance in ore prices as compared with advances in pig iron and finished materials is very moderate. Tables published elsewhere in this issue show that since the price of ore was fixed for 1916, bessemer pig iron has advanced 62.2 per cent, while the advance in the price of old range bessemer ore just made is 33.7 per cent. Advances in the prices of important semi-finished and finished materials in the same period have been as follows for future delivery:

	Dec. 8, 1915	Nov. 22, 1916	Per cent advance
Bessemer billets, Pittsburgh	$29	$55	89.7
Steel bars, Pittsburgh	36	58	61.2
Beams, Pittsburgh	36	60	66.7
Tank Plates, Pittsburgh	36	70	94.6
No. 28 black sheets, Pitts	50	80	60.0
Connellsville furnace coke	2.35	3.75	59.6

Even the most conservative observers were willing to grant that an advance of $1.25 was justified, and in view of the decided trend upward of other products and the likelihood that these products will show much higher quotations during the next few months, the advance of $1.50 certainly is not excessive and buyers have shown their acquiescence by gladly giving directions to have reservations changed into contracts.

Daniels, a Hopeless Misfit

AS AN official, Secretary of the Navy Josephus Daniels is hopelessly incompetent. In private life, he is a country editor, whose important functions he is credited with having filled creditably, but during the almost four years that he has been the titular head of a great department of the government, he has not shown the slightest sign of developing any of the qualifications required by his office. He seems to be inherently unable to outgrow the ways, thoughts and duties of his adopted private vocation. It may be that Mr. Daniels ought to be pitied more than censured. The point is, however, that his continuance in office is extremely unfortunate for the entire country. Never before in its history did the demands of that office require so urgently the service of an able, progressive, broad minded man as it does in these times. Never before did the country have at the head of the navy department a man less qualified than Mr. Daniels. He has been adversely criticized from all quarters. The

THE OPEN HEARTH

country could forbear with patience, and, in fact, with happy anticipation, if it knew that Mr. Daniels was to remain at his post only until next March and then make way for the appointment of a successor constitutionally and otherwise equipped to satisfactorily perform the duties of the office. The prospect for such a situation seems slim. It appears likely that President Wilson will make the grave mistake of reappointing Mr. Daniels.

One can look back over Mr. Daniels' administration in the most liberal minded manner and hardly search out anything that he has originated which is of a constructive character. He is understood to have conceived the idea of selecting the naval consulting board, and if this is so, it is one worthy plan for which he may be gladly given credit. Most of the other desirable plans of his administration seem to have been forced upon him, either through public opinion, or at the insistent suggestion of his advisers, who, it may be said, are intelligent men of foresight and practical ideas. If their advice had been heeded altogether, it is safe to say there would be a far different and much more refreshing story to tell regarding Mr. Daniels' administration.

Many ideas originating with Mr. Daniels might be cited to exhibit him as a ridiculous figure. One will suffice at present. It relates to his pet project for a government owned armor plate plant. The strongest reasons condemn this scheme. Not one sound reason has been or can be offered in its behalf. Ignorance, spite, politics and pork do not make reason. Those are the only factors that ever have been rallied in defense of a government armor plate plant.

Mr. Daniels, having succeeded in getting congress to enact legislation providing for the plant, ought to be a good winner at least. It should not be difficult to be sportsmanlike and dignified after being victorious. Mr. Daniels, however, was unable to be either. When he announced awards last week for armor, he repeated his tiresome clown-act of criticizing the armor manufacturers, not on account of the prices they quoted in connection with tonnage under immediate consideration, but on account of figures submitted some years ago. He again tried to glorify himself for the "savings" he had brought about because the armor prices were lower, in some instances, this year than heretofore. His statement gives an index to a mind which will not or cannot comprehend. The prices were necessarily made as low as they were partly because the tonnages, never before approached for size, assured capacity operations, thus reducing tremendously the big overhead charges. Patriotism was another element, regardless of what Mr. Daniels may say or think. But he did not have the good taste to commend the manufacturers for their low figures, submitted at a time when the cost of labor and material is so extremely high. The profit on the contracts, if there is any, will be negligible. Unlike Mr. Daniels, however, the manufacturers never whine.

Josephus Daniels, as secretary of the navy, is an utter misfit.

A Grave Danger Averted

AMONG the many other things for which the United States has reason to be thankful today is the fact that the country has escaped a contest as to who was elected President on Nov. 7. Whether viewed from a standpoint of business or of pure patriotism, a prolonged controversy such as that of 1876 would have been highly deplorable, and yet how easy it would have been to have had a controversy even more serious than that of '76. As it was, a small majority in the state of California decided the election, and at times it seemed as though the result might hinge on the vote of one or two electors. In two states electors died so near the date of election that it was feared the names of men selected to take the vacant places had not been printed on all the tickets and that for this reason, while other electors of a certain party would be elected, the men newly placed on the tickets would not be successful. Thus the popular will would be defeated. Regardless of the cause, it would be extremely unfortunate to have the result of a presidential election in the hands of one or two men.

In order to prevent controversy as to the result of the election, and also to bring about a more truly popular method of electing, we believe that the electoral college should be abolished. Senator Chamberlain, of Oregon, has announced that at the coming session of congress he will offer a constitutional amendment to abolish the electoral college and to provide for the popular election of President and vice president. The original idea of the framers of the constitution of giving the electors the right to vote according to their judgment for the presidency became obsolete many, many years ago and the electoral system as now carried on is a farce. Every elector is in honor bound to vote for the nominee of his party and, be it said to their credit, never, not even in the trying days of the Hayes-Tilden contest, has a single elector betrayed his trust, but, if there ever was a sound reason for establishing an electoral college, it no longer exists. Constitutional changes are brought about slowly and congress should lose no time in starting to make this one.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products November 29, average for October, 1916, average for August, 1916, and average for November, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Nov. 29, 1916.	Aver. for Oct., 1916.	Average for Aug., 1916.	Aver. for Nov., 1915.
Bessemer pig iron, Pittsburgh..	$33.95	$24.325	$21.95	$17.45
Basic pig iron, Pittsburgh.....	30.95	20.825	18.95	16.70
No. 2 Fdy. pig iron, Pittsburgh	30.95	21.075	19.45	16.45
Northern No. 2, Fdy., Chgo...	27.50	19.15	19.00	17.12
Lake Superior Charcoal, Chgo..	29.75	20.35	19.75	17.50
Malleable, Chgo.	27.50	19.50	19.50	17.40
Southern No. 2, Birmingham..	22.00	15.13	13.75	13.13
Southern Ohio No. 2, Ironton..	26.00	19.38	18.50	16.13
Basic, eastern Pa.....	27.50	20.75	19.25	17.75
No. 2X Virginia furnace.....	26.00	18.50	18.50	15.50
No. 2X foundry, Philadelphia..	27.50	20.75	19.75	17.50
Ferro mang., Balti.....	164.00	162.00	175.00	100.00
Bessemer billets, Pbgh.....	55.00	45.75	43.60	27.75
Bess. sheet bars, Pbgh.....	55.00	45.75	43.60	28.25
Op.-h'th sh. bars, Pbgh.....	55.00	45.75	43.60	28.50
Open-hearth billets, Pbgh.....	55.00	45.75	43.60	28.00
Steel bars, Chgo.....	3.09	2.79	2.77	1.79
Steel bars, Chgo., contr.....	3.09	2.60	2.50	1.625
Iron bars, Philadelphia.....	2.659	2.659	2.559	1.759
Iron bars, Cleveland, local del'y	2.90	2.55	2.40	1.50
Iron bars, Chgo. mill.....	$2.70	$2.35	$2.35	$1.48
Beams, Chgo. contr.....	3.19	2.80	2.77	1.79
Beams, Pittsburgh, contr.....	3.00	2.70	2.50	1.625
Beams, Philadelphia	3.159	2.859	2.709	1.809
Tank plates, Pbgh., contract....	3.50	3.00	2.90	1.625
Tank plates, Chicago contr.....	3.69	3.19	3.17	1.79
Tank plates, Philadelphia.....	4.159	3.309	3.909	1.809
Sheets, blk., No. 28, Pbgh.....	4.50	3.225	2.75	2.22
Sheets, blue an., No. 10, Pbgh.	3.75	3.125	3.00	1.85
Sheets, galv., No. 28, Pbgh....	6.00	4.45	4.25	3.90
Wire nails, Pittsburgh.....	2.85	2.625	2.59	1.87
Connellsville fur. coke, contr...	3.75	3.375	2.40	2.35
Connellsville fdy. coke, contr...	6.00	4.875	3.15	2.96
Heavy melting steel, Pbgh.....	23.50	17.87	16.00	15.31
Heavy melting steel, eastern Pa.	23.00	15.50	15.00	14.50
Heavy melting steel, Chgo.....	22.00	16.50	14.90	13.15
No. 1 wrought eastern Pa.....	25.00	22.00	20.00	17.00
No. 1 wrought, Chgo.....	24.00	17.50	15.40	12.75
Rerolling rails, Chgo.....	27.00	18.75	15.70	14.30
Car wheels, Chgo.....	17.50	12.25	11.90	12.75

(For Additional Prices See Page 1124.)

Pig Iron Prices Advance Rapidly

Foreign Buyers Anxious to Take All Bessemer Available—Basic Marked Up $5 at Pittsburgh and Other Grades Advancing Almost as Fast

New York, Nov. 28.—An additional heavy tonnage of pig iron orders of not less than 100,000 tons has been put on the books of producers from buyers in this district during the past week and on a rising scale of prices. The major portion of the business closed has been for delivery after July. The same disposition to distribute orders without publicity has characterized the market operations of the larger buyers. Two or three additional sales, each involving 10,000 tons and upward of various grades, are known to have been terminated. The Worthington Pump & Machinery Corporation was the buyer of all but a few small lots against its last half inquiries totaling 25,000 tons. The American Brake Shoe & Foundry Co. closed for 7,000 to 8,000 tons; a Newark hoisting machinery builder for 4,500 tons of foundry at prices ranging from $27.66 to $29.95, delivered; and another Jersey buyer for 4,000 tons, including some standard forge. There have been many smaller sales. A soil pipe interest figuring on a round tonnage did not buy. A Newark steel plant wants 5,000 tons of last half basic; another Jersey buyer, 2,000 tons of foundry. Eastern Pennsylvania No. 2X has been sold up to $29.50, furnace, or $30.24, tidewater. There also were sizeable sales within a few days at $27, furnace, or $27.95, delivered, and of Central Pennsylvania No. 2X at $25.50, furnace, or $27.66, delivered. The latter seller since has advanced to $27.50, furnace. Virginia iron to the same buyer went at $28, delivered, or $25, furnace. Buffalo makers ask $30 for early, and $28 for forward.

The most interesting development in the export field has been the open offer of leading purchasing representatives of the French and British governments to take all the standard bessemer tonnage that is tendered, indicating the difficulty of getting adequate supplies of this grade. Bessemer for export has been quoted at $33 to $35, furnace.

Southern foundry iron for early shipment is scarce and exporters could put through much tonnage were it available. New inquiries include 5,000 tons for Holland; 2,500 tons for Sweden and 2,000 tons for Roumania. A Montreal merchant asked 20,000 to 25,000 tons of basic and 5,000 to 10,000 tons of low phosphorus. Japan bought 4,000 tons of eastern low phosphorus for last half at $45, furnace.

The English Market

Birmingham, Eng., Nov. 17.—There appear to be very good sales for all classes of pig iron except the commonest of forge material. In the Cleveland district, sellers could take on a much larger volume of business if they could see their way to deal with it. But the government insists more strongly than ever upon preferential, and if necessary, exclusive service, and, in view of this, furnaces are not selling to other people far ahead. The small surplus available for general sale is eagerly taken up. The export trade is exceptionally quiet, owing to the scarcity of tonnage. If ships were available some parcels for which government certificates have been obtained could be sent away. In the Midland district the strength of the makers' position is indicated by a new movement recently commenced to alter the system of transport as between the buyer and the seller

Heavy Foreign Demand

Buffalo, Nov. 28.—The sales during the past week reached a total of about 25,000 tons of all grades, with the deliveries being largely for last half needs of 1917. Sales are continuing and the inquiry is increasing rather than diminishing. The minimum for prompt shipment on practically all grades, except some low silicon iron

(*For complete prices see page* 1124.)

is now being held firmly by all local producing interests at $30, at the furnace.

One prominent melter with a branch in England has come into the American market for the iron required by its foreign branch and took a considerable part of the tonnage reported for the week. It is stated that owing to the scarcity of pig iron abroad it will be necessary for this English branch to depend upon American producers until after the European war is over at least. Demands from this and other foreign sources, it is pointed out, will increase the seriousness of the situation as far as the domestic melters are concerned.

The $30 price is being held for all deliveries extending over next year with the single exception of the offerings of one interest which at the time has available tonnage to offer for last half of 1917 needs at $28 to $30. The steelmaking irons are being quoted above $30 and up to $36.

A factor in the local market situation is the coming in of iron produced in other centers being offered at $26 to $28 for delivery in the Buffalo district.

Roof Pried Off

Pittsburgh, Nov. 28. — Increased operating costs, resulting from the advance of $1.50 a ton in the price of iron ore, higher prices of coke and limestone and further increases in wages of employes, combined with tremendous demand for all kinds of iron, have sent prices of pig iron grades to even higher levels than those prevailing a week ago. Frequent predictions are heard that bessemer iron will command $50 and basic $40 a ton before the spectacular upward movement is arrested.

A Cleveland blast furnace interest has sold 1,500 tons of bessemer iron for delivery in April, May and June at $34.48, delivered, or $33.53, valley furnace, to a consumer in this district. A Birmingham, Ala., melter a few days ago bought 1,000 tons of bessemer iron at $31, valley. Small lots of this grade have commanded $35, valley, and most dealers are asking that figure as the minimum for shipment in 1917. The latter part of last week, a local dealer sold 4,000 tons of standard bessemer at $32, valley, for second half delivery. Inquiries for export involve 30,000 tons for shipment to England and France and 10,000 tons for Italy.

Basic pig iron last week registered an advance of $5 a ton by the sale of about 34,000 tons to an eastern Pennsylvania consumer at $30, valley. The iron involved will be delivered the second half of next year. A nearby stack has sold some basic iron on the basis of $30, valley. On the other hand, it is claimed by some that this grade still is available at $27, valley.

No. 2 foundry and malleable irons are being held at from $30 to $31, valley. Scattering lots have been sold at the minimum figure. Several days ago, a local consumer bought 2,000 tons at $28, valley. Gray forge is being held at from $29 to $30.

Chicago Iron Higher

Chicago, Nov. 28.—Although northern foundry and malleable pig iron have been resting somewhat for the past fortnight on moderate demand and sales, the upward movement has been resumed. Quotations on northern iron now are $27.50 to $28.50, Chicago furnace, for prompt, first half and second half delivery. Occasionally a premium is asked on prompt iron and a recent sale of about 400 tons is said to have been made at $29.50, but as this was an exceptional case, it does not represent the market.

Inquiry is good and small lots of spot iron are being taken. Some first half inquiry is being entertained, although not to a large extent. Most inquiries are for second half, but this business has not reached the proportions of a buying movement.

Southern iron is being quoted at $22 to $23, Birmingham, for immediate delivery and first half, but buyers find difficulty in placing orders for either of these deliveries, as southern iron seems unusually scarce up to July 1. For last half delivery, prices cover a wide range, some furnaces being willing to book at $21, Birmingham, while others are asking all the way from this figure to $25, Birmingham.

Lake Superior charcoal iron is higher and is now moving on a basis of $29 to $30, furnace, which is equal to $29.75 to $30.75, delivered Chicago. Orders for this grade of iron are accepted only after being submitted to the furnace, and no actual schedule of prices is made.

Jackson county silveries continue scarce and difficult to obtain, and recent transactions have fixed $34, furnace, as the price.

Market Strong, Prices Very High

Cleveland, Nov. 28.—The pig iron market at Cleveland is very strong, with prices advancing rapidly. One firm is quoting $33, furnace, on bessemer, and $31 on basic, foundry and malleable, and $30 is regarded as the minimum. Another firm has sold nearly 100,000 tons of various grades this month and has now on hand inquiries for 45,000 tons. Among the inquiries pending is one for 1,000 tons per month for the first half of next year from the United Steel Alloy Corporation. Consumers seem to be entirely willing to buy at the present high prices, but sellers are not urging them to do so.

Still Advancing

Cincinnati, Nov. 28.—Advances on both southern and southern Ohio pig iron continue to feature the market. Southern No. 2 foundry is now quoted from $21 to $22, Birmingham basis, for the last half of next year. A premium of from $1 to $2 a ton is being asked for first half shipment, but very little is to be had for that delivery. A small amount for spot delivery is available at around $25 to $26, Birmingham basis, but prices for this iron depend entirely upon conditions surrounding each sale.

Southern Ohio No. 2 foundry iron is being held at $25 to $26, Ironton basis, for the last half of 1917. No tonnage is available for either the first half or spot shipment.

Southern Ohio silvery iron has taken a decided advance, and today is held between $36 and $37, furnace, for 8 per cent silicon for the last half. None is to be had for the first half.

Transactions today are lighter than at any time this month. This is because of the scarcity of iron for first half shipment, and also because the majority of the larger melters have covered for requirements over the next six or eight months. The only general inquiry before the market is for 2,000 tons of special iron from the Southern railroad for shipment to its Lenore, Tenn., shops.

Sales of Southern Basic

Birmingham, Ala., Nov. 27.—Between 20,000 and 25,000 tons of basic iron was taken on by one of the large producers during the week at a price practically equivalent to the market price of foundry pig iron, viz., $20 to $21 per ton at the furnace. This additional basic tonnage has removed just that much foundry iron from the market. It is understood that this iron is to move into the eastern market. Some very heavy tonnages of foundry iron have been sold during the week at a price around $20 per ton at the furnace. In fact, the aggregate transactions of the week have practically put all the producers out of the active market—they now being contented to hold up on sales pending a solution as to the future "pulse" of the situation. All sellers are able to obtain a much higher price for any spot iron that

(*For complete prices see page* 1124.)

they care to take on. Quite a few sales have been made on the basis of $22 to $23 per ton at the furnace—and in some instances as high as $22 per ton for gray forge iron. There is no use denying the fact, however, that several thousand tons of southern iron have been placed on the books the past week around $20 per ton at the furnace. In the case of the more favored brands of iron, as much as $21 per ton has been obtained on substantial tonnages. One large producer quotes as minimum $21 per ton, with the statement that he has not as yet opened his books for the last half of next year.

Rapid Price Advances

Philadelphia, Nov. 27.—Price advances have continued so rapid in pig iron in eastern territory that the true market is exceedingly difficult to quote. Almost daily changes have been occurring, as is illustrated by the fact that one maker raised his schedule $3 within the week. Buying is very active and quotations by agents now are being made for immediate acceptance but subject to approval by the furnace. Operating difficulties due to coke delays and car shortages still are a market factor of some importance. Eastern Pennsylvania foundry iron has been sold for last half of 1917 up to $29.50, furnace, for No. 2 plain and at $29, furnace, or $29.75, Philadelphia, for No. 2X. One maker now quotes $29, furnace, minimum for No. 2X; another $28. Central Pennsylvania iron still is offered at $26.50, furnace, or about $28.25, Philadelphia, although a 3,000 ton sale in that district at $28, furnace, is reported. There is some doubt whether this sale is for delivery in the Philadelphia district as reported. Virginia 2X is being quoted from $26 to $28, furnace, with sales of special quality at $29, furnace. Alabama makers ask from $22 to $25, Birmingham, for No. 2, but evidences of $20 still were present this week. Eastern Pennsylvania standard forge is held at $26, furnace. A Pottstown, Pa., buyer closed for 1,000 to 1,500 tons of this grade, but a recent inquiry for 7,500 tons remains open. The Norfolk & Western railroad placed about 6,000 tons of various grades for last half, and a Lynchburg, Va., pipe foundry 1,000 to 1,500 tons. The Lenoir Car works want 2,400 tons of foundry and there is a Washington inquiry for 1,000 tons of special analysis. Many 500 and 1,000-ton lots are coming out and being closed.

Basic is higher, but how much so is not clear, as no new sales are reported. At least $27, eastern Pennsylvania furnace, now is asked. A sale of 1,000 tons of Virginia basic for last half was made at $29, furnace. One eastern Pennsylvania consumer tentatively is inquiring for 10,000 to 12,000 tons last half; a tidewater works wants 5,000 tons last half and an Eddystone, Pa., plant 1,000 tons. Standard low phosphorus from the last was sold this week at $50, delivered Pittsburgh, and to this territory at $47, furnace, or $49.62, delivered. From $48 to $50, furnace, depending on grade, now is asked. The week's sales were 4,000 to 5,000 tons. Lebanon low phosphorus was sold this week at $47.50, furnace, and $50 was quoted. There has been some inquiry for standard bessemer on which $34, furnace, was named to middlemen. A local inquiry for 2,500 tons of mallable, last half, is current. The large Warwick furnace at Pottstown has gone out for relining, to be idle two or three months.

Ferro Wavers

Prices May be Reduced to Meet Domestic Competition

New York, Nov. 28.—Considerable discussion continues current in the market regarding the probabilities of an early announcement by English producers of an official reduction in the ferro-manganese prices for 1917 delivery to meet the competition of certain domestic makers. The latest reports show some difference of opinion as to whether a general cut will be made. Some of the English makers this week cabled their price remained unchanged and stated they could handle no more business before the second quarter. The recent selling of ferro-manganese has been almost entirely in the hands of the home makers, because their prices have been below the $164, seaboard, quotation of the English producers and the latter have obtained little business since this price was adopted. There has been talk that one English seller would shade this price. Now that the market on ferro-manganese for the first half of 1917 and beyond is opening, it is expected that the English furnaces will make a more vigorous bid for new business, especially since they are approaching the time when their old contracts will be shipped out. Pending inquiries for the first half total about 5,000 to 10,000 tons, including one for 2,400 tons.

Contrary to reports of the possibility of lower prices on the English product, the domestic makers have continued to stiffen their schedules and $165, delivered, usually is their minimum except to the most attractive trade. In some cases, $167.50, delivered, was quoted this week on domestic business and $175, seaboard, for export. It has come to light, however, that on some of the recent sales for forward delivery recently quietly closed in the west, prices were at $155 to $157, delivered.

There is an inquiry pending for 1,000 tons of early spiegeleisen. This metal continues to hold greater strength at $50 to $55, furnace, for 20 per cent, with more emphasis on the higher figure.

It is believed that some of the larger buyers of 50 per cent ferro-silicon now are covering on their next year's requirements though there has been no open manifestation of this fact.

Indian Ore Sale

Philadelphia, Nov. 28.—An additional sale of several thousand tons of Indian manganese ore has been put through by sellers in this district to a producer of ferro-manganese at the prevailing range of 65 to 70 cents, per unit of manganese, at tidewater.

Lower Grades Advanced

Pittsburgh, Nov. 28.—Sellers of lower grades of bessemer ferro-silicon have advanced prices $7 a ton for delivery the second quarter of next year. They now are asking $42, furnace, for 10 per cent material. Demand is described as heavy. The market for ferro-manganese is more active than previously, but prices are unchanged. The market for spiegeleisen is quiet.

Fair Inquiry

St. Louis, Nov. 27.—The inquiry for pig iron in the St. Louis market is fair, but there seems to be nothing in the way of large tonnages. Sales last week were somewhat light, with the exception of 2,500 tons of southern Nos. 2 and 3 in Belleville, Ill., and a small amount of Lake Superior charcoal iron. Prices on southern No. 2 iron are stiff at $22.50 to $25 a ton for last half delivery, Birmingham basis. Northern iron is held at $28 to $29 a ton, Chicago, and $28 to $29, Ironton.

Claire Furnace Sold

E. W. Mudge & Co., Frick building, Pittsburgh, have purchased the properties of the Claire Furnace Co., Sharpsville, Pa., consisting of one blast furnace, originally built in 1869. The stack, 75 x 16 feet, now is operating on bessemer pig iron, and the Mudge company will continue to make that grade. The Claire Furnace has been controled by L. C. Hanna and the product sold by M. A. Hanna & Co., Cleveland. The stack will be rebuilt and enlarged at an early date. It has been in operation only about two years in the past decade. Its capacity is about 7,500 tons per month.

(*For complete prices see page* 1124.)

Higher Warehouse Prices

Quotations Again Advanced in Leading Centers and Business Limited Only by Ability to Replenish Stocks

Pittsburgh, Nov. 28.—Warehouses on Nov. 22 advanced prices $5 a ton all along the line, to meet corresponding advances announced Nov. 20 by the Carnegie Steel Co. and other concerns. Warehouses are quoting structural shapes at 3.75c; plates at 4.25c; bars and small shapes, including flats, rounds and squares, under 2 inches, 3.65c; 2 inches and over, 4.30c; H sections, 3.85c.

Warehouse managers are unable to replenish stocks and none of them is in a position to furnish large quantities of single sizes. Fabricators are active buyers of warehouse material.

Marked Up at Cleveland

Cleveland, Nov. 28.—In harmony with recent advances in mill prices, warehouse prices of shapes, plates and bars have been advanced $5 per ton. Prices are now as follows: Steel squares, 2 inches and over, 4.25c; steel rounds, 2 inches and over, 4.25c; steel bars under 2 inches, 3.75c; iron bars, 3.70c; shapes, 3.85c; plates, 4.35c; hoops, 4.50c. Prices on sheets have been advanced $5 on galvanized and blue annealed and $12 on black. Quotations are now, No. 28 galvanized, $6; No. 28 black, $4.50; No. 10 blue annealed, $4.15. Business is limited only by the ability of the warehouses to replenish their stocks.

Chicago Stores Advance

Chicago, Nov. 28.—An advance of $7 per ton on bars, shapes and plates was put into effect late last week by Chicago warehouses. This brings the store price on bars to 3.60c, Chicago, on shapes to 3.70c, and on plates to 4.35c. No. 10 blue annealed sheets were advanced $4 per ton to a quotation of 4c, while No. 28 gage black sheets were advanced to a basis of 4.60c, Chicago store. Structural rivets are now 4.50c from warehouse, and boiler rivets 4.60c. No. 28 gage galvanized sheets now are 6.50c.

Higher at Cincinnati

Cincinnati, Nov. 27.—Warehouse prices have been advanced. Iron and steel bars are quoted from 3.70c to 4.25c, shapes and plates from 3.80c to 4.35c, and No. 10 blue annealed sheets at 4.15c, all f. o. b. Cincinnati. Cold rolled bars are unchanged at 10 plus the list price. Warehouses are finding it a difficult matter to keep up shipments due to inability to secure material from mills. Demand is heavy for all forms of structurals and reinforcing bars.

Advanced at Buffalo

Buffalo, Nov. 28.—The warehouse prices at Buffalo have been advanced again and the indications are that the peak is far from being in sight. Bars, under 2 inches, are being now quoted at 3.75c, and bars, 2 inches and over, are holding at 4.40c, while the price on structural shapes has gone to 3.85c.

Store Demand Active

New York, Nov. 28.—Warehouse prices in the metropolitan district again have advanced $5 per ton. The new schedule lists wide plates at 5c, delivered; narrow plates at 4.75c, and structural shapes and steel bars at 3.75c. The store demand is very active.

Cast Iron Pipe

Prices at Chicago Have Advanced $8 During the Month

Chicago, Nov. 28.—Although cast iron pipe had been increased $6 per ton in a fortnight, an additional $2 was added to the price late last week, making a total of $8 increase during the present month. This makes the quotation on 4-inch pipe at Chicago $42 to $43, and on 6-inch and larger $39 to $40. Pipe makers are finding from their regular customers among municipalities that extensions involving larger sizes of pipe are being omitted in estimates for next year's work and only those necessary extensions which involve small sizes are being undertaken. This is simply a policy of retrenchment on account of the present high price of pipe.

The United States Cast Iron Pipe & Foundry Co. has been awarded 1,000 tons at Duluth, Minn. Practically no inquiries of importance are now under consideration, but as soon as cities make out their estimates for 1917, large tonnage probably will be offered.

Another $2 Advance

New York, Nov. 28.—Another advance of $2 a ton, effective Dec. 1, is announced by certain eastern producers of cast iron pipe and this new price is expected to be adopted generally. The advance will place 6-inch Class B at $39.50, New York, and 4-inch Class B at $42.50, New York. A few more requests for tonnages of pipe from municipalities are coming out, but, in the main, this class of buyers has covered on its needs or is deferring action because of present prices. Buffalo will take bids Dec. 1 on 2,000 tons of 3-inch to 60-inch, representing its 1917 requirements. R. D. Wood & Co. received 760 tons for New Bedford, Mass., at $38.39, delivered, for the 6, 8 and 10-inch, and at $37.24, delivered, for the 12 to 30-inch. The Standard Cast Iron Pipe & Foundry Co. received 300 tons of 6 to 16-inch for Woburn, Mass., at $37.36, delivered. Private buying continues liberal. There are numerous export inquiries, but lack of ships blocks this business.

Active Demand for Prompt

Birmingham, Ala., Nov. 27.—The pipe interests of the district report that notwithstanding the continued rise in pig iron, and consequent advance in pipe prices, there is being booked a substantial tonnage for prompt delivery. This situation has carried the fall buying movement late into this year. While there seems to be some difference in price quotations being made by the various interests, one of the largest producers in the district authorizes the following prices per net ton, f. o. b. cars at the plant: Four-inch, $31.50, 6-inch and up, $28.50, with $1 extra for gas pipe and 16-inch length pipe.

Cold Rolled Strip Steel

Pittsburgh, Nov. 28.—Quotations below 7c, base, rapidly are disappearing, according to sellers and buyers of cold rolled strip steel products. However, the 6.50c figure continues to be enjoyed by some consumers for shipment the first quarter of next year. Although mills have not opened books for second quarter delivery, much of the tonnage now on hand cannot be delivered until after April 1, next.

Nuts, Bolts and Rivets

Pittsburgh, Nov. 28.—Another advance of $2 a ton was announced a few days ago by rivet manufacturers in western Pennsylvania, who now are quoting 4.25c for structural and 4.35c for boiler rivets. Nut and bolt discounts, which were put up about 10 days ago, are being well maintained. Demand for all three products is described as heavy.

The Aluminum Co. of America, Pittsburgh, plans to build a plant at Baltimore.

(*For complete prices see page* 1124.)

Car Builders Buy Plates

Orders Placed for Large Tonnages at Eastern Mills —Active Demand for Ship Material

Philadelphia, Nov. 27.—Car builders have closed with eastern mills during the week for round tonnages of universal and sheared plates, and the result has been to further strengthen these classifications, which have been erratic. Predictions now are being made of 6-cent tank steel in the near future. One maker booked a specific order for 10,000 tons of universals for shipment as able over the next several months at 3.75c, Pittsburgh, and now is quoting 4c, Pittsburgh, as a minimum. Another mill took about 5,000 tons of universal plates for cars at 4c, Pittsburgh. On sheared plates one large eastern mill now is quoting 5c, Pittsburgh, for tank, or $5 advance, and another 4.50c, Pittsburgh, minimum. On flange and fire box steel an order for 2,000 tons for shipment by next September was placed in the east this week at 5.15c and 5.20c, Pittsburgh, respectively. Numerous large buyers who have contracts for tank and other qualities with eastern mills are endeavoring to add to these tonnages with indifferent success, as the makers are choosing new orders with great care. The Pennsylvania railroad has inquired for 2,000 tons of light plates. Ship plates remain in great demand despite the high prices which are at a minimum of 5c, Pittsburgh, and the extended deliveries. Various inquiries of this sort for 1918 shipment continue to appear. One maker is asking 5.50c to 6c, Pittsburgh, on ship plates, Lloyds specifications. A sale of 500 to 600 tons at 5c, Pittsburgh, is noted. Some of the larger mills decline to make any new quotations on ship steel until the protections covering the bids on naval vessels to the government are settled.

Foreign propositions are numerous. Norwegian ship builders in person have approached eastern platemakers, asking for large tonnages. These yards had been obtaining their steel from Germany, but since September this supply has been shut off, owing to difficulties having arisen between the two countries, and the industry in the United States now is being appealed to. A recent sale of 7,000 tons was made to Japan by an eastern mill.

Demand Continues

Pittsburgh, Nov. 28.—Demand for steel plates continues decidedly heavy, notwithstanding prevailing high prices. Several mill managers say specifications last week were much heavier than previously and considerable new business is being booked. All manufacturers are asking 3.50c and above for shipment at their convenience. For prompt delivery, mills are quoting from 4c to 4.75c. The United States Steel Corporation has bought 750 steel cars from the Ralston Steel Car Co. and 1,250 from the Pressed Steel Car Co. The Pittsburgh & Lake Erie railroad has ordered 2,000 cars from the Standard Steel Car Co.

Plates Still Advancing

Cleveland, Nov. 28.—The plate market in Cleveland is very strong. Minimum quotations by Cleveland mills are now 4.25c to 4.50c, Pittsburgh, an advance of $5 to $10 per ton over recent quotations. The trend of prices in the east is upward, while 4.75c, Pittsburgh, for sheared plates and 3.75c to 4c for universal are still quoted by leading eastern makers. It seems probable that the lower quotation on universals will soon disappear.

Inquiry From Norway

Buffalo, Nov. 28.—Through a Canadian source an inquiry has come into the Buffalo market for 16,000 tons of shipbuilding material for Norway.

Coke Still High

Spot Furnace Advances While Foundry Reduces Slightly

Pittsburgh, Nov. 28.—Spot furnace coke is selling at $7.50 a ton, or 50 cents above the previously prevailing maximum price. Foundry coke, on the other hand, has receded slightly in price, now being offered at $9 a ton. Demand for 48-hour fuel is rather heavy, consumers apparently believing that production will be cut down by the observance of Thanksgiving Day. The Columbus Iron & Steel Co. has closed for 48,000 tons of furnace coke for shipment the first six months of next year. The fuel involved will be furnished by West Virginia interests. *The Connellsville Courier*, for the week ending Nov. 18, says production was 398,299 tons, compared with 421,513 tons the week before.

High Prices Prevail

Philadelphia, Nov. 28.—High prices prevail on spot and early coke in this territory, although a considerable spread still obtains in the sales figures. A transaction, involving 2,000 tons of Connellsville furnace coke for early shipment, was closed at $7.50, ovens. A lot of 25 cars was obtained by an eastern Pennsylvania furnace at $7.25, Connellsville ovens, and there were some purchases by the same consumer at $6.50, ovens. Sales of spot Latrobe foundry coke at $9.75, ovens, and of Connellsville coke at $9.50, ovens, are noted.

Some Relief

Cincinnati, Nov. 27.—The coke market has been slightly relieved by the sudden appearance of foundry coke for contract shipment from both the Wise county and Pocahontas districts. It is quoted all the way from $5.50 to $7, ovens, for delivery after Jan. 1, 1917. No furnace coke is available from either the Wise county, Pocahontas or New river districts. Sales today consist largely of small lots for spot shipment, at prices ranging all the way from $8 to $10 a ton.

Strong at St. Louis

St. Louis, Nov. 27.—Connellsville foundry coke is strong at $9.50 to $10.50, and Virginia foundry grades at $9 to $9.50, f. o. b., ovens, in each instance. The demand for by-product coke is so strong that prices are quoted from day to day, only. Foundry grades are held at a basis of $9 a ton.

Slow Delivery

Cleveland, Nov. 28.—Sales of foundry coke for prompt delivery have been made during the past week at $8.75 to $9.50, ovens. There seems to be no prospect of prices declining and complaints in regard to car shortage and slow delivery continue.

Will Build Furnace at Shreveport, La.

Representatives of the Texas Iron & Steel Co. and the United States Reduction Co. have recently visited Cass and Marion counties, Texas, inspecting the iron ore deposits of these counties. These two companies, according to the announcement made following the meeting of their representative, will build a blast furnace at Shreveport, La., erection of which will begin just as soon as materials and machinery can be assembled. Those constituting the inspection party follow: B. F. Wood, president of the United States Reduction Co.; Charles S. Bradley, W. H. Huttig and R. J. Tinsel, of New York; A. C. Elliott, of Dallas, and Major Ed Fry, of Marshall, Tex.

(*For complete prices see page* 1124.)

Sheet Prices Arbitrary

Influenced Largely by Sheet Bar Situation, Which is Far From Satisfactory, But Deliveries Are Improving

Youngstown, O., Nov. 28. — The sheet market in the Mahoning valley has become an arbitrary affair, with manufacturers naming their own terms and buyers glad to buy at almost any price. Because of their irregular facilities for production, due mainly to their inability to procure sufficient sheet bars, the manufacturers are, in many cases, compelled to ask prices considerably above market. One large concern has, within the last few days, sold several large lots on the following basis: Black sheets, 5c; blue annealed, 4.50c; galvanized, 7c.

No one appears to be quoting black sheets at less than 4.50c to 4.75c, blue annealed 3.75c to 4c, galvanized 6c to 6.50c. The manufacturers say that the end does not appear to be in sight. While there has been a slight letting-up in the car shortage situation, nothing like normal transportation conditions obtains. The labor situation is a little better, but the continued high and increasing cost of the materials of production, according to the sheet manufacturers, makes lower prices impossible. One interest states that it gladly paid $60 a ton this week for a lot of sheet bars.

Deliveries of sheet bars are improving, but not nearly fast enough to satisfy the sheetmakers, many of whom cannot bring to their mills half the tonnage they succeed in buying. Few of the mills are receiving enough bars to operate on full time.

Actual sales of either black, blue annealed or galvanized continue to be few, and mostly to regular customers. The sources of supply nowhere are able to meet the demand. The manufacturers have ceased to compute the daily tonnage they are obliged to turn away. To their regular customers they are doling out allotments based proportionately on previous volumes of business with each.

A greater general demand for galvanized continues. The lesser demand for blue annealed than for either black or galvanized is reflected in its comparatively slower advance in price.

The waiting rooms of sales managers' offices these days, more densely populated with purchasing agents than of yore, are not studies in cheerfulness.

Prices Nominal

Pittsburgh, Nov. 28.—With the more prominent manufacturers of steel sheets out of the market, it is increasingly difficult to determine the position of prices. While the American Sheet & Tin Plate Co. has made no changes in quotations since the adoption of the 4c figure for black sheets, quotations of the American concern represent the market only in a general way. It is doubted whether the average consumer could buy sheets at prevailing minimum prices. Some concerns are asking 4.25c for black sheets, while others are refusing to figure in the market at any price.

Blue annealed sheets continue to be quoted at a wide range in price, due to the fact that no two mills seem to be asking the same prices for the several gages. The American Sheet & Tin Plate Co. has made no change in its quotations this week, but an early advance in prices is expected.

Galvanized sheets are extremely scarce and it is not believed that they are obtainable at less than 6c, base. However, no formal quotations are being offered by leading makers.

Prices Again Advanced

Philadelphia, Nov. 27.—Leading eastern Pennsylvania makers of sheets have again advanced prices. This time $10 a ton to 4c, Pittsburgh, or 4.159c, Philadelphia, for No. 10 gage blue annealed and are making sales on this basis. The demand is good, but buyers are disposed not to order beyond three months ahead. A few orders for the second quarter have been placed. The American Car & Foundry Co. is in the market for 2,000 to 3,000 tons for railway coach construction. The foreign demand is large, one inquiry calling for 5,000 tons and another for 1,000 tons. The export inquiries invariably specify the same sizes, or 60 inches wide by 120 inches long of Nos. 8 to 12 gage and as these are about the maximum width for some makers, the latter are unwilling to take much tonnage of this character.

Hard to Satisfy

Canton, O., Nov. 27.—One of the leading sheet manufacturers in this territory has called in all his salesmen; the sales manager is devoting most of his time to explaining to impatient buyers why he cannot supply them with as much tonnage as they want. He says he is turning away inquiries for more than 10,000 tons a day.

Inability to get sheet bars in sufficient quantity is keeping some of the mills to one-third time. Transportation conditions are slightly better, but conditions generally, including the increasing cost of materials, continue to provide the manufacturer with legitimate excuses for failure to satisfy his customers.

Ruling prices are: Black sheets, 4.50c to 4.75c; blue annealed, 3.75c; galvanized, 6c to 6.50c. But many sales are above these figures, according to specifications. For their regular customers in some cases the manufacturers even try to act as brokers, undertaking, in the face of practical impossibility, to buy from brother manufacturers to satisfy their own trade.

In this district, the conscientious sales manager is drawing upon all his diplomatic abilities to make his customers see that they are all of them in the same boat.

(*For complete prices see page* 1124.)

Wage Increases

The Heywood Bros. & Wakefield Co., operating large chair plants in Wakefield and Gardner, Mass., has set aside an amount of money for division among the employes who have been in its service one year or more. The amount will be from 1 per cent of yearly earnings for one year's term of service to 5 per cent for five or more years' service.

The Clinton Wire Cloth Co., Clinton, Mass., has increased the pay of its employes, effective Nov. 27. It will be the second increase since Jan. 1. The first increase amounted to 4 per cent.

The Ensign-Bickford Co., Simsbury, Conn., leader in the United States in the manufacture of safety mining fuses, has granted an increase in pay amounting to an extra 10 cents a day for each of the 500 employes in its plant in Simsbury and Avon, Conn.

Bids on New Worth Works

Philadelphia, Nov. 28.—Preliminary bids have been asked for the construction of the new steel works which J. S. Worth, W. P. Worth and associates are planning to erect on a site recently acquired at Claymont, Del. Plans have been issued to the contractors for figures on the construction of four open hearth furnaces of modern size and of the buildings to enclose them. It, apparently, is the intention of the Worth interests to get the building of their steel plant started in advance of the other departments of the works. No bids yet have been asked for the blooming or finishing mill buildings.

The Trumbull Steel Co., Warren, O., has posted notices of an advance in wages of about 10 per cent.

Bars Are Actively Sought

Prices to be Made to Agricultural Implement Manufacturers and Other Users Not Determined

Philadelphia, Nov. 27.—A number of the smaller users of steel bars are expected to be in the market soon for first quarter contracts and some of the mills are preparing to ask nothing less than 3c, Pittsburgh. The larger buyers who are able to offer more attractive tonnages seem to have their first half need pretty well under cover. There is some miscellaneous current business going through on which 2.90c to 3c, Pittsburgh, now the minimum of the market, is being quoted and some orders at this level are noted. The mills, however, are not anxious to increase their obligations of this kind and will accommodate only regular customers and then not until pressure is applied. A large Philadelphia jobber has covered on a recent requirement for 3,000 to 4,000 tons for first quarter placing this, it is understood, at 2.70c, Pittsburgh, before the last advance was announced. The Pennsylvania railroad has out a new inquiry for 2,000 tons for first half, which is in addition to its previous regular contract purchases.

Buying Far Ahead

Chicago, Nov. 28.—Steel makers who are pursuing the policy of selling to regular customers for indefinite delivery find demands are increasing rather than decreasing and bookings are far ahead of shipments. In some instances, last week saw the heaviest tonnage put on the books that has been taken in any similar period in the past. The result of this heavy demand and continuous buying is that some large makers find that they are completely sold for the first nine months of 1917, and have comparatively little tonnage left for the final quarter of that year. A further advance of $2 per ton on steel bars, to bring western mills to the same level as eastern, has made the nominal quotation for remote delivery 3.09c, Chicago mill. Premium prices paid for similar material for better delivery range as high as the necessity of the buyer will force him and 3.50c to 3.75c is not beyond the actual range.

Implement Makers Inquire

Cleveland, Nov. 28.—Agricultural implement manufacturers are sounding the market as to the price they will be compelled to pay for steel bars for the last half of next year, but nothing definite has developed. It is understood that the manufacturers are considering making another advance in prices of implements. On 2,000 tons, for delivery within four months, one large independent company has quoted 3.25c, Pittsburgh, and that is probably the lowest price obtainable for anything approaching prompt delivery. Hard steel bars have been advanced to 2.90c, mill, by one of the largest producers. Recent sales made in this territory were at 2.70c to 2.75c, mill. A large addition to be built to the Wigmore Coliseum will require from 1,200 to 1,500 tons of reinforcing bars.

Reinforcing Bars Active

Pittsburgh, Nov. 28.—The steel bar trade is featured by a heavy demand for reinforcing material. Mills are receiving heavy specifications for shipment the first quarter of next year and considerable new tonnage has been booked the last 10 days. Steel bars are being held at 2.90c by the Carnegie Steel Co. and that figure represents the bottom of the market. Iron bars are commanding 2c in some instances.

Bar Iron Stronger

Chicago, Nov. 28.—Chicago makers of bar iron find conditions strong and prices higher. There is some irregularity in the market, and sales are being made from 2.65c to 2.80c, Chicago mill. The minimum price is being taken by mills which did not sell as heavily in the recent buying movement as others, while the maximum quotation has applied on a few small tonnages and is not representative of the market. The bulk of sales are at 2.70c to 2.75c, Chicago mill.

Shafting is Strong

Pittsburgh, Nov. 28.—Although the 20 per cent off the list price has not entirely disappeared, the market for cold rolled steel shafting is gradually being established at 15 per cent off the list. Demand is described as heavy, but deliveries have improved somewhat. For prompt shipment, the list price frequently is being paid and in some instances consumers are paying above list.

Hoops and Bands

Pittsburgh, Nov. 28.—The Carnegie Steel Co. is asking 2.90c for steel bands, or $4 a ton above the previously prevailing price, but has made no change in its price of steel hoops, which continue to be quoted nominally at 3.25c. For shipment before April 1, one manufacturer is quoting hoops at from 4c to 4.25c, and bands from 3.85c to 4c. Some mills are unable to promise deliveries before July 1, 1917.

(*For complete prices see page* 1124.)

Steel Pipe

Is in Active Demand and Heavy Tonnages are Pending

Pittsburgh, Nov. 28.—A western Pennsylvania interest is negotiating for 20,000 tons of iron and steel pipe, to cover its first half requirements, and an Ohio gas interest is in the market for 10,000 tons of steel pipe for delivery the first six months of 1917. Nearly all pipe manufacturers have enough tonnage on their books to keep plants operating at present rates of capacity well into the second quarter of 1917. Advanced prices of boiler tubes, announced Nov. 20 by the National Tube Co., have been established. The market for charcoal iron boiler tubes is difficult to define, owing to the fact that manufacturers are not sending out published discount lists.

Plenty of Orders

The Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn., has assured its employes that it and its subsidiaries have enough contracts with Russia and other European governments to keep the plants running for several years, despite the threatened withdrawal of English and French contracts. The American Tube & Stamping Co., the Bridgeport White Metals Casting Co. and other Bridgeport manufacturers which are executing contracts for 5,000,000 shrapnel shells for the Russian government will be busy for months to come, while the Remington Co. still has enough contracts for cartridges and bayonets to keep most of the departments going until 1920. Despite these assurances many employes of Bridgeport munition plants are preparing to leave for other cities owing to the high cost of living.

Dayton Iron Co. Organized

Dayton, Tenn., Nov. 28. (By wire.)—Application was filed here today for a charter incorporating the Dayton Iron Co. with authorized capital of $500,000. The new company will enter a bid on all the property of the defunct Dayton Coal & Iron Co. Incorporators of the Dayton Iron Co. are M. M. Allison, John Stagmair, E. B. Thomason and J. J. Lynch, of Chattanooga, and A. P. Haggard, of Dayton.

Scrap's Upward Movement

Has Not Stopped and Higher Prices Are Being Quoted in Leading Centers—Railroad Lists Not Large

Cleveland, Nov. 28.—An unsatisfied demand for iron and steel scrap keeps the local market on all grades going upward. Despite sales of tonnages to consumers, prices do not weaken, but actually grow firmer or else even rise. Holding of scrap with speculative aims apparently is not as widespread as earlier in this boom period, but some is still to be noticed.

All heavy grades of steel, wrought and cast iron scrap have been subject to rapid advances for many days, but the latest big moves are those of the light grades of material, such as borings, turnings and hand bundled sheets. Machine shop turnings have almost doubled in value in less than 40 days.

An estimate of the total volume of trading done last week in this city is placed at 50,000 tons, representing a money value of possibly $1,000,000. The trade has no records that beat this.

Chicago Advance Continues

Chicago, Nov. 28. — Although some check has been given to the rapid rise in quotations on iron and steel scrap, the upward movement has not stopped, and various items are marked up from the levels prevailing last week. Decided scarcity has developed in some quarters because of inability of railroads to furnish cars, and small offerings of railroad scrap is also having an effect. One rerolling mill in the west has been shut down for more than a fortnight because of inability to obtain rerolling rails, although it has plenty under contract which the seller is unable to move.

The only large railroad list recently disposed of was 4,500 tons sold by the Rock Island railroad last week. Current offerings include 2,200 tons by the Burlington railroad, 1,700 tons by George W. Jennings, and 60 tons by the Pullman Co.

Market Broadening

Philadelphia, Nov. 27.—Buying of heavy melting steel continues to broaden at constantly rising prices and this is the leading feature in an active and buoyant market for all grades of scrap in this district. A Schuylkill valley steel plant which has been actively in the market recently bought 5,000 tons of steel additional at $23, delivered. It is not believed this price could be duplicated and some sellers are talking $24 to $25. There have also been new steel orders placed for Harrisburg, Trenton and Pottsville delivery, though in some cases the material has not been of No. 1 quality. Brokers have been offering in the east $24.25, delivered Johnstown, for steel, which tends to confirm the report of heavy purchases for that point at $25, delivered. An eastern foundry interest paid $33, delivered, this week for low phosphorus scrap, which is scarce and very strong. All other grades are quotably 50 cents to $2 per ton higher this week.

Question of Delivery

Birmingham, Ala., Nov. 27.—The dealers in old material report that it is not so much the question of selling scrap as it is to secure the material. Owners of scrap throughout the Birmingham district are assembling all the available material around their plants, but are as cautious in getting quotations on same as if it were pig iron. One large furnace interest has assembled its scrap with the view of using it in its furnace, if satisfactory prices cannot be obtained. This interest has refused $14 per ton at the plants for its mixed scrap. Some of the heavy scrap users have special men canvassing the situation.

Some Grades Stronger

Cincinnati, Nov. 27.—The iron and steel scrap market is featured this week by the sudden strength shown by borings and turnings. These materials have been weak for the past month, due to the fact that supply has been larger than consumption. Today, however, demand has increased to such an extent that quotations are $2 a ton above those that prevailed last week. Machine shop turnings are now quoted from $8.50 to $9, and cast borings from $8 to $8.50, both per net ton. Heavy melting scrap continues in good demand and has advanced slightly, being now quoted from $20.50 to $21 per gross ton. The general tendency of the market is upward.

Heavy Melting Scarce

Buffalo, Nov. 28.—Prices in the scrap market seem to be advancing daily. Dealers report that heavy melting steel is extremely scarce and that consumers will have to face a shortage in the near future. The signs of shortage are also apparent in the other lines of better grades of scrap. The movement of the market is upward. Advances reported with the turn of the week have advanced again over night on old iron rails, cast borings, locomotive grate bars, heavy axle turnings, machine shop turnings, railroad malleable, No. 1. railroad and machine cast scrap, No. 1 railroad wrought, stove plate and wrought pipe. The additional advances have been from 50c to $1 per ton.

(*For complete prices see page* 1124.)

Prices Swing Upward

Pittsburgh, Nov. 28.—Prices of iron and steel scrap continue to swing upward rapidly. The Cambria Steel Co. is reported to have bought 2,500 tons of heavy melting steel at $25, delivered, and some dealers regard the market in the immediate district quotable at that figure. Low phosphorus steel scrap is being held at as high as $30 by some interests. Blast furnace managers have been buying heavy tonnages of turnings and borings for delivery the first quarter of next year. Some dealers are asking $12 a ton for both stocks.

Demand Increasing

St. Louis, Nov. 27.—The advance in prices of scrap last week were hardly as pronounced as for the previous week, although the demand for material is increasing. The railroad offerings recently have been so limited in tonnage that dealers are bidding up everything in sight in order to be able to fill their old contracts. Most of the larger consumers are active bidders, as they are using up their reserves rapidly. Cast iron car wheels are in great demand at present, as a substitute for higher materials, and sales at $21.50 gross ton have been made.

Rerolling rails are very scarce and it is predicted that this grade will sell for $30 a gross ton before the close of the year. The only railroad offering before the market is a list issued by the Chicago, Burlington & Quincy calling for about 2,000 tons.

Toledo Shipments

Toledo, O., Nov. 28.—The scrap market in Toledo is fairly steady after a week of unrest. One company is shipping all the metal it can secure to the Cleveland and Chicago markets. More than 200 tons of scrap are being shipped every week by this concern and if cars were available, twice that amount would be shipped, according to Abe Kasle. Melting steel is bringing $19, No. 1 busheling $17.50, cast iron $15.50, stove plate $12, light steel $15, malleable $14.

New Structural Offerings

Are More Numerous Than Usual for This Time of the Year in Spite of High Prices and Slow Delivery

New York, Nov. 28.—Fabricating interests comment upon the tonnage of new structural offerings for this period of the year, which are stated to be more liberal than usual in this territory. In this city, a number of new office apartment house and other projects of a speculative type are appearing, which is rather surprising, in view of the high costs of construction. New work from the railroads continues one of the leading factors of the market and a good tonnage is pending, including the large bridge budget for the Lehigh Valley railroad. Shape prices now are quoted from 3c to 3.25c, Pittsburgh, or 3.169c to 3.419c, New York, some of the eastern mills having adopted the higher figure this week.

Demand is Liberal

Philadelphia, Nov. 27.—Some of the eastern Pennsylvania makers of structural shapes are adopting a new advance of $5 a ton. One producer of standard sections has raised its price from 3c to 3.25c, Pittsburgh, and another of special shapes from 2.90c to 3.15c, Pittsburgh. Another maker is practically out of the market at 3c, Pittsburgh. The demand for shapes is very liberal from buyers both in the east and in districts ordinarily not served from eastern Pennsylvania and the mills are selling conservatively. One western buyer was in the east this week, offering 4,000 tons for any delivery and another a smaller amount, but the mills did not quote. Worth Bros. have offered tentatively the first construction inquiry for their new steel works at Claymount, Del., which calls for four open-hearth furnaces, requiring about 5,000 tons. The Pennsylvania railroad is out for 1,000 tons of shapes for first half. The Cambria Steel Co. received 15,000 to 20,000 tons of the 45,000-ton shape inquiry for France, against which J. P. Morgan & Co. recently distributed orders. One eastern mill received 3,000 tons of beams and other mills participated. The price seems generally to have been 3.25c, Pittsburgh.

Structural Mills Swamped

Pittsburgh, Nov. 28.—Fabricators and erectors are finding it increasingly difficult to obtain material, and many of them are calling upon warehouses for heavy tonnages. The Carnegie Steel Co. continues to quote structural shapes at 3c for shipment at its convenience. Some independent manufacturers have withdrawn from the market, not wanting to accept additional tonnages at prevailing prices.

Chicago Demand Holds

Chicago, Nov. 28. — Although structural shapes were advanced $4 per ton last week in two equal steps, bringing the quotation for delivery at convenience to 3.19c, Chicago mill, buying of shapes has not been materially checked. Mills which continue to sell are taking more than they are producing, and fabricators are anxious to obtain further supplies.

Lettings of structural material during the past week include 3,500 tons for track elevations in Chicago and general bridge work by the Chicago & Northwestern railroad, which will be fabricated by the American Bridge Co. An unusual letting under present market conditions is 1,000 tons for the Stability Building Co.'s office building at Los Angeles, which will be fabricated by the Baker Iron Works. The number of projects booked in the past week is larger than usual.

CONTRACTS AWARDED.

Chicago & Northwestern Railroad Co., bridge betterment on various divisions and Mayfair track elevation (various locations), 3,500 tons, to American Bridge Co.

Stability Building Co., building at Los Angeles, 1,000 tons, to Baker Iron Works.

Booth-St. Louis Cold Storage Co., building No. 4 at St. Louis, 756 tons, to American Bridge Co.

Gary Land Co., six subway bridges at Gary, Ind., 740 tons, to American Bridge Co.

Wabash Railroad Co., one 90-foot deck turntable, three 90-foot through turntables, and one 130-foot pony truss span, (location unknown), 491 tons, to American Bridge Co.

I. Leisey Brewing Co., stock house and ice house at Cleveland, 434 tons, to T. H. Brooks Co., Cleveland.

Preparatory Seminary for Archdiocese of Chicago, at Chicago, 314 tons, to Hansell-Elcock Co.

R. Jones Estate, automobile sales building at Chicago, 158 tons, A. F. Anderson Iron Works.

Illinois Steel Co., sand mill building, new ingot handling shop at St. Louis, 150 tons, to American Bridge Co.

The Michigan State Telephone Co., Detroit, has awarded the Russel Wheel & Foundry Co., Detroit, general contract for a building in which 4,000 or 5,000 tons of structural material will be used. The Bethlehem Steel Co. will furnish a part of this material.

Atlas Crucible Steel Co., Dunkirk, N. Y., plant addition, 400 tons, to McClintic-Marshall Co., Pittsburgh.

Several office buildings in Philadelphia, 1,000 tons, to the American Bridge Co.

Bridge work for the Grand Trunk railroad, 200 tons, to the Lackawanna Bridge Co.

Mosby department store, Richmond, Va., 500 tons, to the Richmond Structural Steel Co.

Extension to pier No. 39 North river, New York City, for the Central Railroad, of New Jersey, 150 to 200 tons to Milliken Bros., Inc.

Steel frames for cranes for the Browning Engineering Co., 750 tons, the American Bridge Co.

Extension to plant of the American Rolling Mill Co., 250 tons, American Bridge Co.

Factory building and power house for the National Acme Mfg. Co., Cleveland, 1,850 tons, McClintic-Marshall Co.

CONTRACTS PENDING.

Power house for New York Central Lines, New York City, from 1,500 to 2,000 tons.

Open hearth steel works for Worth Bros. interests, Claymount, Del., about 5,000 tons, bids being taken.

Office building, Baltimore, 250 tons, bids being taken.

Bridges for the Pennsylvania railroad, 1,000 tons, bids being taken.

Schwartz factory building, East Twenty-second street, New York City, 900 tons, bids being taken.

Office building, Thirty-second street, New York City, 1,500 tons, bids being taken.

Addition to Wigmore Coliseum, Cleveland, 1,200 to 1,500 tons reinforcing bars.

(*For complete prices see page* 1124.)

Car Orders

Made a Good Total for November—Active Rail Buying

New York, Nov. 29. (By wire.)—November's car orders totaled 35,000 to 40,000 and still are coming. The Union railway, a Corporation road, has ordered 1,250 hoppers of the Pressed Steel Car Co. and 750 of the Ralston Steel Car Co. The New York Central has closed for 750 stock cars with the Merchant Despatch Transportation Co. in addition to 2,000 hoppers to the Standard Steel Car Co. previously noted. The Norfolk & Western inquires for 2,000 gondolas and 1,000 box cars. The Los Angeles & Salt Lake wants 1,000 to 1,500 general service cars.

Western roads have placed about 150,000 tons of rails for 1918 with the Corporation at the new prices.

Milliken Bros. take 1,600 tons of steel for the White Plains subway yards, this city, and the New England Structural Steel Co. will get 1,400 for a telephone building at Providence.

Brier Hill Steel Co. Buys Land

Youngstown, Nov. 29. (By wire.)—The Brier Hill Steel Co. has purchased 250 acres, known as the Van Wye farm, adjoining its Western Reserve mill at Warren. Some big extensions are planned. The company is now completing its by-product coke ovens and two additional open-hearth furnaces.

Billets High

And Supply is Limited—Some Plants Are Closed

Pittsburgh, Nov. 28.—A western Pennsylvania manufacturer has sold a rather heavy tonnage of open hearth sheet bars at $56.50, mill, for shipment the first quarter of next year. The culmination of this transaction offers a rather interesting insight into the market for future delivery. It is not believed that billets or sheet bars could be obtained at less than $55, mill, and some makers are asking $60. The scarcity of material appears to be more pronounced than ever. Some consumers have been forced to shut down departments temporarily, on account of the shortage of steel.

Demand Exceeds Supply

Philadelphia, Nov. 27.—Requests for billets and other semi-finished forms of eastern mills are far in excess of the unsold supply running into the third quarter, and much business is going begging. Pittsburgh buyers have been asking eastern makers for both slabs and slab ingots with small results. Regular customers are endeavoring to increase their former purchases for first half. The export inquiry is very heavy. One eastern producer who has been making sales for the third quarter of next year has accumulated such a tonnage that he has ceased his offerings. It is reported that $60, mill, can be obtained for open hearth rerolling billets were the steel on hand. Forging billets are held at $70 to $75, eastern mill. An eastern sale of 2,000 to 3,000 tons of sheet bars for Ohio shipment at $55, mill, is noted. Shell steel discards for the first half are less freely obtainable from eastern makers following the closing of some round lots for export at $37.50, mill, negotiations for which were recently reported. This material is stronger around $40, mill. Small lots have brought upwards of $55, mill.

Billets for Italy

Buffalo, Nov. 28.—A large tonnage of billets has been sold in this market to meet the needs of consumers in Italy, and there is an inquiry now pending for billets to be shipped to France.

Sheet Bars Sold at $50

Youngstown, O., Nov. 28.—Sheet bars are bringing $60 a ton, with ready buyers at that price. The $55 maximum of a few days ago has become the minimum, and nobody can be found who is succeeding in getting bars at that price today. A large lot at $60 was sold Monday to a sheetmaker in the valley, with no definite assurance as to delivery.

Deliveries are slightly better than last week, but there still remains a large margin for improvement.

The B. & O. railroad has placed an emphatic embargo on the use of hopper cars for the shipment of billets. In several cases the bottoms of the cars have been forced down and out, resulting in wrecked freight trains.

The demands of the finishing on the semi-finishing mills continue far in excess of the possible supply, although most of the finishers are not so badly off as they were earlier in the month.

Rail Buying

Is Now Proceeding at a Lively Rate for Next Year's Delivery

New York, Nov. 28.—Heavy buying of rails by domestic roads for 1918 shipment now is getting into full swing. The New York Central system has closed for approximately 150,000 tons about equally divided between the Steel Corporation mills and the Lackawanna Steel Co. The Erie has purchased 40,000 to 50,000 tons from different mills. Other sales have been closed in eastern territory and a number of inquiries are pending, including among others about 20,000 tons for the New Haven.

An inquiry for 205,000 tons of 100 and 130-pound rails for 1918 delivery has been issued to the mills by the Pennsylvania railroad. The specifications are to be the same as those adopted in 1915 and which have applied both to the 1916 and 1917 contracts. The railroads apparently, are not disposed to bring in the new questions of specifications under present steel trade conditions. The 115,000 to 120,000-ton rail inquiry from British buyers remains open.

Car orders of the week again were heavy and were approximately from 8,000 to 10,000. The Pittsburgh & Lake Erie placed 2,000 70-ton hoppers with the Standard Steel Car Co.; the Nickel Plate, 750 gondolas and 500 hoppers with the Pressed Steel Car Co.; the Lackawanna railroad, 500 hoppers with the Pressed Steel Car Co. and 500 box with the American Car & Foundry Co.; the Great Northern, 500 automobile and 500 refrigerator with the Haskell & Barker Car Co.; the Missouri, Kansas & Texas, 1,000 stock to the American Car & Foundry Co.; Bethlehem Steel Corporation, 150 hoppers to the American Car & Foundry Co., and there were other orders.

Locomotive orders are very numerous. The Baldwin Locomotive Works has received 45 of different types from the Southern railway; the American Locomotive Co. took 25 from the Wabash, 25 from the Nickel Plate, 12 from the Florida East Coast, four from the Birmingham Southern and one from W. R. Grace & Co.

Heavy Rail Tonnage

Chicago, Nov. 28.—Since the announcement of prices on standard steel rails for 1918, railroads have been preparing their inquiries, and during the past few days they have been submitted to rail makers. A total in excess of 500,000 tons is now on inquiry with a considerable tonnage yet to be heard from. Sales in the past few days are believed to have run close to 300,000 tons for 1918 delivery. This business is expected to be closed up in almost all cases within the next 10 days. Some roads are inquiring for their full requirements for 1918 work, while others are buying about half their probable needs at present, and probably will enter the market for the remainder later. Tonnages already placed vary from a few hundred tons to lots of 15,000 to 20,000 tons.

Along with the buying of rails a large tonnage of track fastenings have been inquired for and considerable sales have resulted. Tie plates for 1918 delivery are quoted at a minimum of $55, while spikes for the same period are being sold at 3c, Chicago, and for 1917 delivery at 2.90c, Chicago. Track bolts are being contracted at 4.25c to 4.50c, Chicago.

Nickel Plate Cars

Cleveland, Nov. 28.—The Nickel Plate railroad is taking bids on 500 hoppers and 750 drop-end gondolas of 55-ton capacity.

Rails and Track Equipment

Pittsburgh, Nov. 28.—Leading manufacturers of railroad spikes declare they will sell no additional tonnages at less than 2.75c. For some time, standard railroad spikes have been offered at several dollars a ton less than the price of steel bars. One manufacturer declares he will not figure in the spike market until more attractive prices are enjoyed.

The Carnegie Steel Co. and other makers of light steel rails have advanced prices $4 a ton to $46 for sections weighing from 25 to 45 pounds. Demand for light rails is rather heavy.

(For complete prices see page 1124.)

Ore Contracts

Are Freely Made at Advance of $1.50 Over This Season's Prices

Cleveland, Nov. 28.—The starting of the selling of Lake Superior iron ore for 1917 has not been accompanied by any excitement. Buyers had made reservations for a large percentage of their estimated requirements. No one has shown a disposition to object to the advance of $1.50 per ton and reservations have been promptly converted into contracts. Very little bessemer ore remains untaken and fear is expressed that there will not be enough of this grade to meet the demand. Some users of non-bessemer ores who have not covered for their requirements may delay somewhat, but the tonnage of non-bessemer ores is not large. A full statement as to new ore prices and history of the buying movements of past years will be found on page 1108 of this issue.

When the ore-carrying rate for next season was established recently at $1 per ton, net, from the head of the lakes, it was not decided what the rates would be for Marquette and Escanaba, but contracts made this week fixed the Marquette rate at 90 cents, net, and the Escanaba rate at 75 cents. The chartering for next year has been very heavy.

The weather during the past week has been extremely cold in northern ports, but has moderated somewhat within the last two or three days and loading is proceeding at a fair rate. It is expected that November shipments will make a good showing compared with shipments for the same month in past years.

Selling Slowly in East

Philadelphia, Nov. 28.—Only moderate tonnages of Lake Superior ore have been sold to eastern furnaces under previous reservations at the new and advanced prices. The new Superior ore schedule represents a basis of 12⅝ cents, per unit, delivered in the Lehigh and Schuylkill valleys for Messabi non-bessemer, and 13 cents, per unit, delivered, for Messabi bessemer, as against approximately 9½ and 10¼ cents, last year. Eastern furnaces are reluctant to pay these higher prices for ore covering a period of 18 months ahead and it is expected that they will draw more heavily than ever before upon local eastern ores.

The prices for 1917 on Port Henry and local New Jersey and New York state orders still is unfixed, but action probably will be taken during the current week. It is expected that these new prices will show a range of from 11 to 12 cents, delivered at the furnaces, and will be below lake prices by a considerable margin. It is understood that reservations by Port Henry and other eastern operators have not been heavy. It is expected, however, that, following the opening of the books, the output of the mines for next year can be sold quickly.

Foreign ores are not a factor of importance in the eastern market under the present conditions of European demand and the high shipping costs. Eastern furnaces in recent weeks, however, have closed for probably 100,000 tons of Spanish bessemer ore for next year at various prices.

Of interest to the iron trade, is the announcement that E. W. Mudge & Co. have purchased the Claire Furnace, Sharpsville, Pa., from the Claire Furnace Co. The stack, which will be enlarged, will continue to operate on bessemer iron.

Wire Advance

Is Again Recorded—Marked Up $6 Since Nov. 1

Pittsburgh, Nov. 28.—The American Steel & Wire Co. on Nov. 24 advanced prices of wire products $3 a ton to the following levels: Wire nails, $3 a keg; plain wire, $2.95; manufacturers' wire, $3.05; galvanized wire, $3.65; galvanized barbed wire, $3.85 per 100 pounds. The wire fence discount was lowered two points to 53 per cent off the list. Cement coated nails were advanced $3 a ton to $2.90 a keg.

Wire products have been marked up $6 a ton since Nov. 1, and now are commanding the highest prices to prevail since the early part of 1900, when the John W. Gates' interests quoted nails at $3.20 a keg. Further advances in price appear imminent. Some people say nails will command $3.25 a keg before spring.

Canadian Demand

Buffalo, Nov. 28.—Sellers report that there has been a heavy demand for wire rods coming from Canadian sources and that as far as known the inquiry has not as yet been satisfied on this side of the border. It is claimed that Canadian users may be forced to close down their plants through inability to get the rod material needed by them.

The rerolling mill of the Republic Iron & Steel Co., at Moline, Ill., is being improved by the installation of a new modern hot bed and better shipping facilities. The latter include the addition of a 10-ton crane with a 5-ton auxiliary hoist.

(*For complete prices see page* 1124.)

Tin Plate Mills

Not Ready to Take Orders for Delivery July 1, of Next Year

Pittsburgh, Nov. 28.—Consumers of tin plate are manifesting interest in the market for shipment the second half of next year, but manufacturers thus far have refused to consider tonnages for delivery after July 1, next. Nearly all manufacturers have disposed of their entire output for delivery the first half of 1917 and it is apparent that prospective purchasers would find it extremely difficult to shade $7, base. Heavy demand exists for export and it is understood that as high as $9, base, has been offered for material for foreign shipment.

Suit Discontinued

The American Steel Co., Pittsburgh, which more than a year ago brought suit against the American Steel & Wire Co. of New Jersey and others, to recover $750,000 damages under the Sherman anti-trust act on account of the defendant company's alleged monopoly in the manufacture and sale of coated wire nails, filed a discontinuance of it in the United States district court in Boston, Saturday. The reason for the withdrawal was not made public, but is supposed to be a result of the decision of Judge James M. Morton, who, in October, overruled the demurrer to the first count, which alleged an attempted monopoly, and sustained the demurrer to the second count charging a combination in restraint of trade.

Contract for Scout Cruiser

Washington, Nov. 28.—Secretary of the Navy Daniels yesterday announced that the Seattle Construction & Dry Dock Co., Seattle, Wash., had been given a contract to build one scout cruiser. Its bid, the only direct one offered in connection with the four scout cruisers carried in the 1917 building program, was $4,975,000. The limit of cost set by congress is $5,000,000. The Seattle company is to deliver the cruiser in 30 months. It seems that it will be necessary for Secretary Daniels to appeal to congress, so that awards for the remaining three scout cruisers can be made. He has said that he did not know what the nature of such an appeal would be. The secretary says that it might not suffice to merely ask congress to increase the limit of cost, because he would not know what the limit should be. The alternative might be to ask that congress provide for the building of the three remaining cruisers upon a basis of cost of construction plus a reasonable profit.

Hearings on Ore Tariffs

Will be Held by Interstate Commerce Commission—Protest Against Terminal Service Expected

Washington, Nov. 28. — Tariffs to be filed with the interstate commerce commission on or before Dec. 1 prescribing new rates and regulations governing the transportation of iron ore from lower lake ports to blast furnace points in western Pennsylvania, Ohio, West Virginia and Kentucky are being awaited with much interest. The new schedules are to be filed in accordance with the order of the commission which was made public in September.

It appears to be the general opinion here that there will be no general objection entered by blast furnace interests against the rail rates themselves, or to the proposed plan of redistricting consuming points. There probably will be at least one exception to this, however, and that relates to the removal of Monessen from the Pittsburgh district, by which the former point is placed in the Johnstown district and its rate increased from 88c to 94c per ton.

The prevailing belief is that the principal protest will be made by ore consumers against the terminal service charge at the blast furnace end, suggested by the commission. At present there is no such charge. The commission suggested that a charge be made upon the basis of the cost per engine hour, such charge to be fixed at a stated amount per ton or per car for each furnace served. The spotting service at the trestle of each furnace is different in nearly all cases. The charge to be fixed in this connection depends upon three factors: First, the volume of shipments; second, the distance from the breakup yard or interchange track, and third, the trestle capacity of the individual blast furnace. This capacity varies greatly. Some trestles make it possible to deliver a train of 30 cars to a furnace in two cuts of 15 cars each, while at another furnace the cars have to be moved in in twos or threes, or even in singles.

There is a difference of opinion as to the proposed charge of 1c per long ton per month as a storage at the docks. This charge is now in effect at Erie, Pa., but at no other port. Those who contend this is not an important item to the consumer base their contention on the fact that the charge primarily comes out of the pocket of the owner of the ore prior to its sale to the blast furnace. The question of storage at the lake front is held to have two distinct points. First, it affects the owner of marketable ore who desires to bring it nearer to the point of consumption for quick emergency sales. When the owner is compelled to pay 1c per ton for storage, he simply pays this charge as a part of the general selling expense. The other angle of the storage matter is that which affects the blast furnace owner of ore bought at the mines or shipped from there for a blast furnace which has no immediate storage room. It is immaterial, therefore, according to the position of the commission, whether the blast furnace provides its own storage facilities, frequently at considerable expense, or pays the carrier for use of its storage facilities at the lake front at a fixed rate per ton. This method is credited with having the advantage of keeping the storage charge to the blast furnace at a definite level, whereas in those cases where the furnace operator provides his own storage facilities during slack periods of use the storage per ton would necessarily be much greater than during periods of heavy consumption.

The commission also named a rate of 6c per long ton for handling the ore from the rail of the vessel into the cars for immediate shipment to the furnaces, a rate of 16c for handling the ore from the rail of the vessel for transportation to the storage yard, and 10c per long ton for handling storage ore from the storage pile into the cars for shipment to interior points. The handling charge on direct ore is advanced to 6c from 2c and the dock ore handling and forwarding charge of 26c is advanced from 8c to 10c. These charges promise to cause considerable protest.

The proposed rates and regulations, to become effective on April 1, are to be the object of a hearing before the commission when ore consumers will offer their criticisms regarding them. The commission will give consideration to the objections previous to fixing the future maximum rates and charges and the rules and regulations.

A statement by the Toledo Machine & Tool Co., Toledo, O., announces a 50 per cent increase in the business for this year and H. J. Hinde, manager of this concern, reports that very little of the work being turned out at present is for war materials. Contracts for the equipment for home industries are numerous, and the concern is working to its full capacity. Equipment for the production of wire wheels for several automobile manufacturers is under construction at present and along with other contracts the plant will be busy for the next nine months.

Attractive Program

Prepared for the Thirty-Seventh Annual Meeting of A. S. M. E. at N. Y.

An attractive and diversified program will be presented at the annual meeting of the American Society of Mechanical Engineers, to be held at the American Societies' building, 29 West Thirty-ninth street, New York City, Dec. 5, 6, 7 and 8. Within the last few years the membership of the society has increased until it embraces at the present time almost 10,000 members. The technical papers to be presented and discussed at the 11 professional sessions are truly representative of the broad field of the society's activities. Probably the main professional feature of the entire convention will be the valuation session, assigned to Thursday morning. As at previous meeting problems of generation of power, as well as those concerning the design and manufacture of tools and machinery, will be discussed at simultaneous sessions.

Dr. D. S. Jacobus will deliver his presidential address on Tuesday evening on the "Relation of Education to Engineering". This will be given in the auditorium of the building, and will be followed by a reception. A memorial meeting will be held Wednesday morning in honor of Dr. John E. Sweet, past president, honorary member and founder of the society.

An outline of the program for the four-day meeting was published in *The Iron Trade Review* of Nov. 9.

Bethlehem Given Options

Valparaiso, Ind., Nov. 27.—What are believed to be the first steps in a plan to establish other steel plants on the south shore of Lake Michigan were revealed last week when Mrs. A. I. Baker, of Chicago, transferred to the Eastern Indiana Land Co. her title to 2,500 acres of land in the northern part of Porter county, most of which fronts on Lake Michigan. The land company, composed of Chicago and Eastern capitalists, has given options to the newly acquired property to the Bethlehem Steel Co. Agents for the company have been engaged for weeks in surveying the property.

Coke Shortage

Causes Serious Trouble for Cleveland Foundrymen

Cleveland, Nov. 29.—Cleveland foundrymen are worried over the coke situation and see no immediate relief in sight. Several large foundries have been obliged to go into the market recently and purchase spot coke at high prices to fill in gaps between the receipt of shipments specified some time ago under regular contracts. On an order of this character recently, one Cleveland foundryman was obliged to pay $10.35 for five carloads or about 200 tons. This foundry, which melts nearly 100 tons of iron daily, has been living on a hand-to-mouth basis as far as coke is concerned for several weeks. Although a strenuous effort is being made to build up a reserve supply, it is feared that shutdowns will be inevitable when winter begins in earnest. This situation is considered typical of a large number of foundries operating in the Cleveland district.

Scrap Active in New York

New York, Nov. 28.—A strong and active market continues in old material in this district and this applies to all grades. Prices still are rising. Both eastern and western Pennsylvania are buying heavy melting steel, but this grade is rather scarce here. For eastern Pennsylvania, $21, New York, is available, while for Johnstown shipment, $21.25 is offered. Country steel was sold at $17, eastern Pennsylvania. Car wheels have been sold at $21, delivered at Jersey points, and heavy cast is commanding from $18.50 to $19, delivered there.

Obituaries

William H. Jaques, an expert on armor plate and heavy ordnance, who in 1887 established this branch of manufacture at the Bethlehem Iron Works, South Bethlehem, Pa., now the Bethlehem Steel Co., was killed by a train in a London suburb, Nov. 23. His body was found on the tracks.

Franklin Morey died at the home of his son-in-law, Clarence H. Howard, president of the Commonwealth Steel Co., St. Louis, Nov. 22, aged 85 years. Mr. Morey was born in Rome, N. Y., 85 years ago and during his early business life was a manufacturer of mining machinery. He is survived by three children, Mrs. Clarence H. Howard, Frank L. Morey and Arthur T. Morey, secretary and manager, respectively, of the Commonwealth Steel Co. Mr. Morey was a Christian Science practitioner.

William L. Kroeschell, secretary and treasurer of the Kroeschell Bros. Co., secretary of the Kroeschell Bros. Ice Machine Co. and interested in other manufacturing lines, shot himself in the writing room of the Illinois Athletic Club at Chicago, Nov. 22, being found dead by fellow members. Despondency over ill health is given as a cause. He was born at Nashville, Tenn., May 22, 1856, removing to Chicago when a boy. He was a member of the board of trade from 1881 to 1900. On the death of an elder brother in 1900, he entered the manufacturing business in which he spent the remainder of his life.

Charles Francis Roper, a noted inventor, died suddenly recently at his home in Hopedale, Mass. Mr. Roper was born in 1847 and was engaged in the development of textile and other machinery most of his life. For more than 20 years, he was associated with the Draper Co. Among Mr. Roper's best-known inventions were his automatic screw machines and a novel propeller for motor boats.

J. Sterling Goddard, for 10 years chief engineer of the American Steel Foundries, died Nov. 22 at his home in Riverside, a suburb of Chicago, aged 44 years. He was born in Monroe, Mich., graduated from Cornell university, moving to Chicago about 12 years ago. Pneumonia was the cause of his death.

Major General George W. Goethals, former governor of the canal zone; George Ade, author and reconteur, and William L. Saunders, mining engineer, will be the principal speakers at the thirty-seventh annual banquet of the Engineers' Society of Western Pennsylvania in the William Penn hotel, Pittsburgh, Dec. 11. Edwin M. Herr, president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, will be toastmaster.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Nov. 28.—The metal markets have reflected only fair activity during the week but the effect on prices has been pronounced, especially in copper and spelter, due to the sold up condition of these metals. Copper now is extremely hard to get for first half, and none of the leading selling agencies are quoting anything this side of third quarter. This position is quoted at 31.50c to 32c, delivered 30 days, with sales at the outside figure. Positions this side of third quarter are quoted as follows: Prompt and December, 34c to 35c, cash; first quarter, 34c to 34.50c, delivered 30 days; second quarter, 33.50c to 34c, delivered 30 days; third quarter, 31.50c to 32c, delivered 30 days. Lake copper also is thoroughly sold up but the producers are able to take small tonnages for nearby shipment. Medium quality lake is quoted as follows: Prompt and December 34c to 35c, delivered 30 days; first quarter, 33.50c to 34c, delivered 30 days; second quarter 33c to 33.50c, delivered 30 days. Ordinary casting copper is quoted at 33c, cash, for November and December and 32.50c, cash, for January. Virgin casting copper is quoted at 32.75c to 33c, usual terms, for first quarter shipment, and 31c, usual terms, for third quarter.

Demand for spelter has involved comparatively small tonnages but producers are pretty well booked ahead and are not anxious to sell, with the result that prices have been advancing steadily. There is considerable variation in current prices, however, due to sales by second hands, evidently made with a view toward influencing the market. Prime western may be quoted as follows: November and December 13c to 13.25c, St. Louis; first quarter 12.87½c to 13c; second quarter 12c to 12.25c. Brass special spelter is quoted on the basis of about 14c, St. Louis, for prompt shipment.

The lead market has been excited and unsettled by reason of the fact that the American Smelting & Refining Co., although it has withdrawn from the market for this year and since has sold January lead at 7.15c, New York, still quotes 7c, New York. The outsiders all have advanced their prices but are not anxious to sell until they see what action, if any, the leading interest will take with reference to its price. The outside market now may be quoted at about 7.20c to 7.25c, St. Louis, and 7.25c to 7.37½c, New York.

The tin market, although exceedingly strong statistically, has sold off somewhat in the last few days, due to a tendency toward profit taking. Although characterized by good buying, last week was less active than preceding weeks; at present the market is quiet. Present indications are that deliveries this month will total between 2,500 and 3,000 tons, while arrivals will not be much in excess of 1,300 tons, thus assuring another heavy decrease in stocks here. At the same time, it continues difficult to secure permits for exporting tin from Great Britain and the Straits. Spot Straits is quoted at 45.25c, and spot Banka at 44.62½c to 44.75c. Future offerings range around 43.12½c, for July shipment from the Straits, and 43.25c for May shipment; none of these offers are accompanied by guarantees of shipment or arrival.

The aluminum market is quiet and prompt and nearby carloads are quoted as follows: No. 1 virgin, 64c to 66c; No. 1 remelted 59c to 60c; No. 12 virgin alloy 47c to 49c; No. 12, remelted alloy, 45c to 46c.

The antimony market is higher, although activity is limited. The leading producer has sold at 16c, duty paid, for spot and 13.50c to 14c, in bond, for December and January shipment from China. Second hands in this market still have spot to sell at 14.87½c to 15c, duty paid.

(For complete prices see page 1124.)

How Enameled Kitchen Ware Is Made

Fig. 1—View of Wrapping Department Showing Enameled Products of Plant

MANY PERSONS have marveled at the number of channels into which the Lake Superior ores and other steelmaking ingredients are directed in the form of finished products, yet few realize how easily the art of modern manufacture disguises each article. Thus, to the public mind, the shining enameled ware which is displayed attractively in shop windows and serves faithfully in American kitchens, seems far removed from the iron and steel industry. This illusion is quickly dispelled in a factory where enameled ware is made. Stripped of its veneer of enamel, each pan and kettle is plainly a steel product. This fact is especially emphasized in the plant of the American Stamping & Refining Co., Massillon, O., where sheets direct from the rolling mill are pressed to shape and enameled in a number of operations which are carried on consecutively under one roof. The plant is situated in the southern outskirts of the city of Massillon, and is directly west of the rolling mills of the Central Steel Co. A two-track siding which enters the shipping department provides switching connections with the Pennsylvania Lines, the Baltimore & Ohio and Wheeling & Lake Erie railroads.

All departments of the plant are in one large concrete and steel building of saw-tooth construction. As indicated in Fig. 11, the building is divided into three principal sections, the largest of which is the dipping and burning room at the east end of the structure. The shipping room, 360 x 90 feet, occupies the central part of the building and the stamping room, 360 x 210 feet, is in the western section. An 80-foot strip of rooms traversing the north end of the building is devoted to the stock, pickling and smelting departments.

The walls of the building are of slab concrete to a height of several feet above the floor. Continuous

FIG. 2—ONE OF THE LARGE STAMPING PRESSES WHICH DRAW THE BLANK SHEETS INTO THE REQUIRED SHAPES. TWO BLANKS AND TWO PANS MADE FROM THESE ARE SHOWN AT THE BASE OF THE PRESS

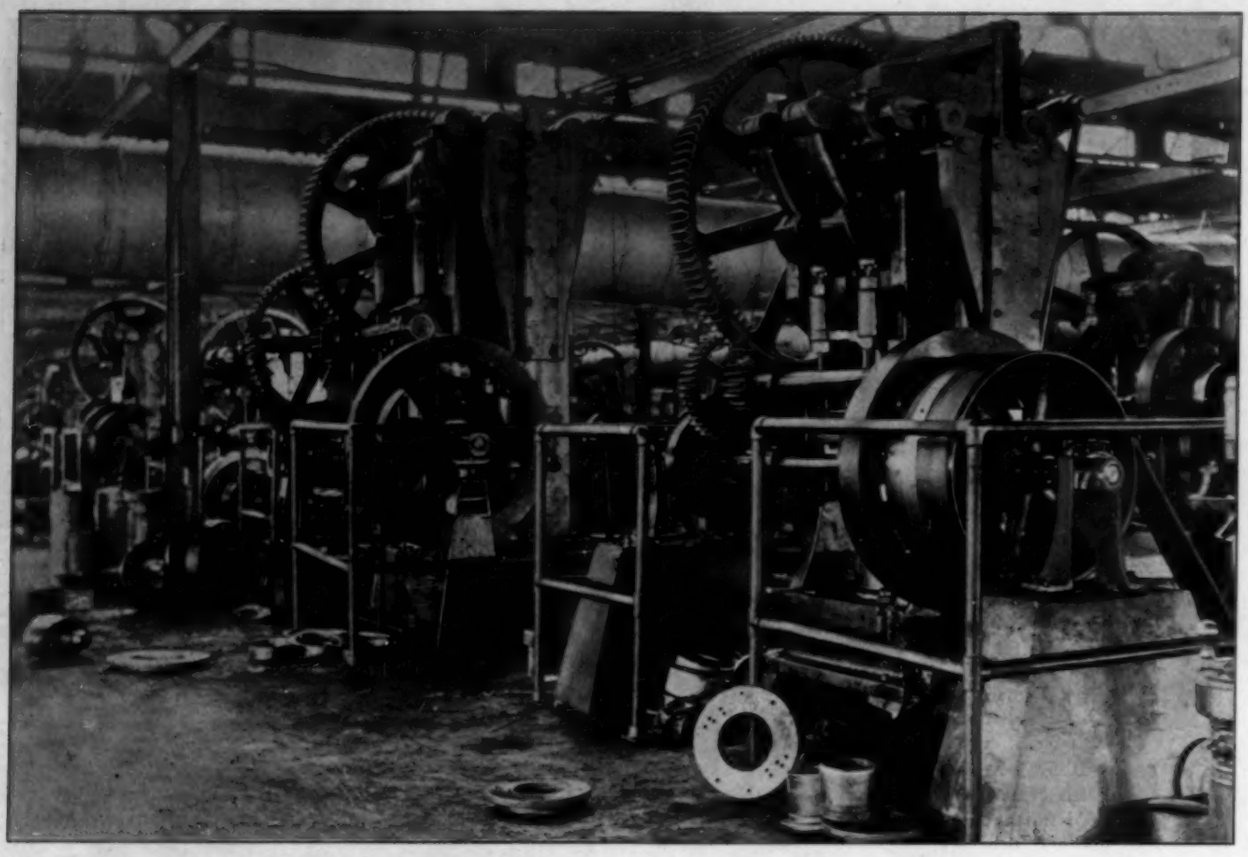


FIG. 3—A VIEW OF THE PRESS ROOM SHOWING A BATTERY OF POWERFUL STAMPING PRESSES. NOTICE THAT NO BELTS ARE VISIBLE. THE MACHINES ARE DRIVEN FROM A COUNTERSHAFT IN A BASEMENT ALONGSIDE THE FOUNDATIONS OF THE PRESSES

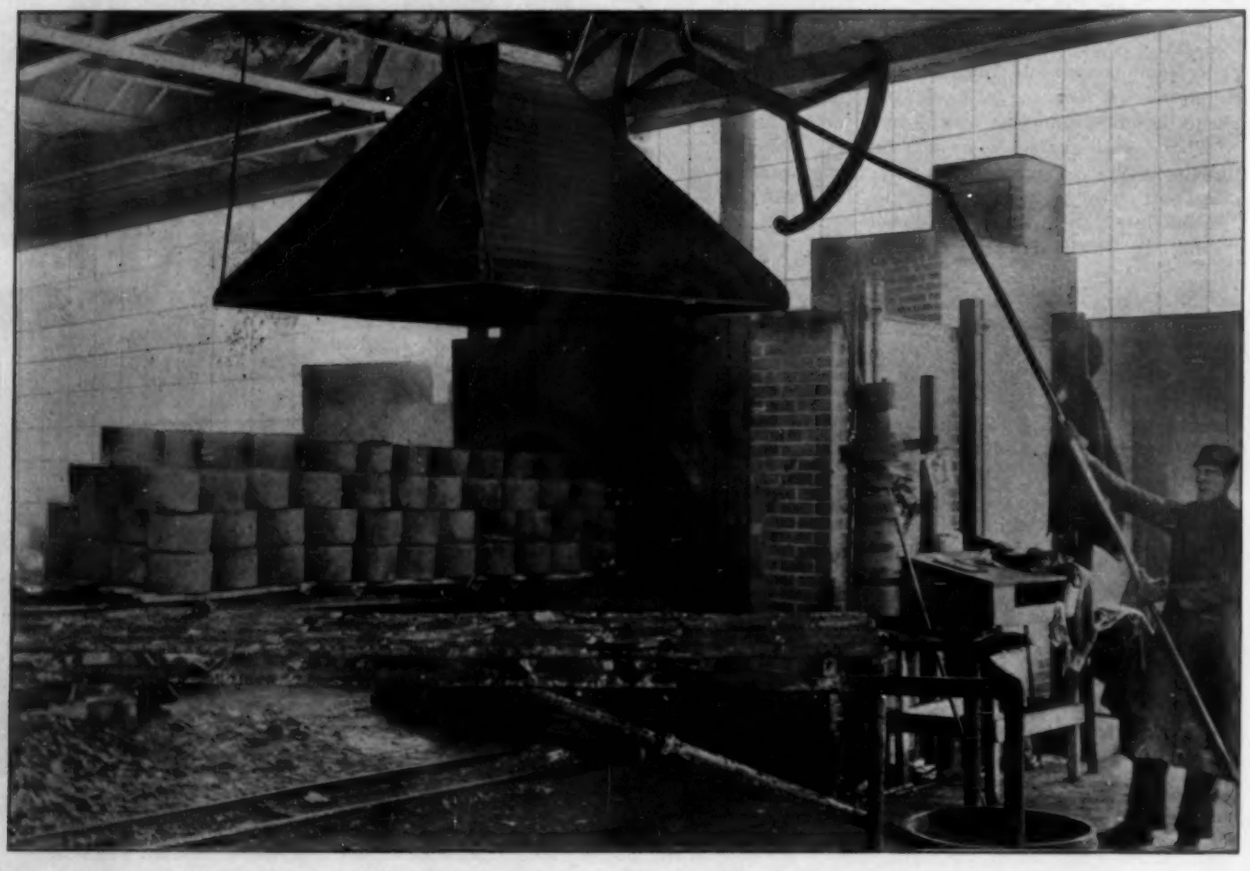


FIG. 4—A GAS-FIRED ANNEALING FURNACE. THE KETTLES ON THE GRID HAVE JUST BEEN REMOVED FROM THE FURNACE. AFTER THE SCALE HAS BEEN REMOVED THESE KETTLES WILL GO TO ONE OF THE LARGE PRESSES FOR THE BULGING OPERATION

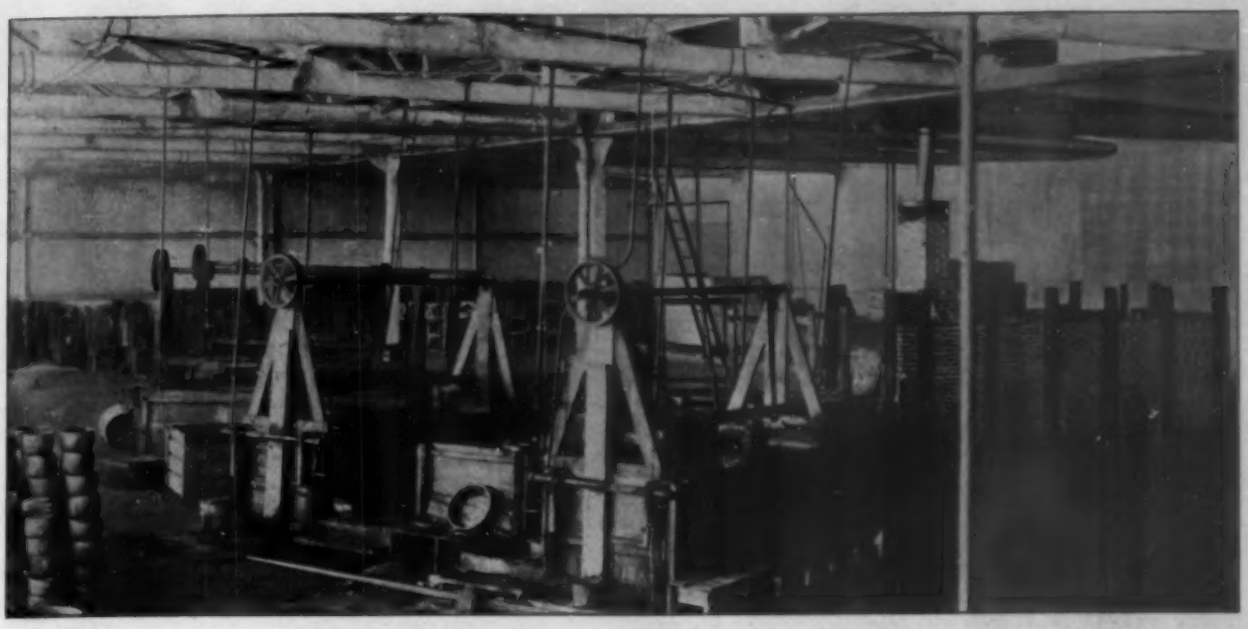


FIG. 5—A VIEW IN THE PICKLING ROOM. THE SHAFTS OVER THE VATS IN THE FOREGROUND INDICATE THE METHOD BY WHICH THE CRATES CONTAINING STAMPED ARTICLES ARE RAISED AND LOWERED IN THE ACID BATH. NOTE THAT THE STEEL WORK SUPPORTING THE ROOF IS COATED WITH CONCRETE TO PROTECT IT AGAINST ACID FUMES

steel sash extends from this wall to the eaves. The roof is of tile supported on steel I-beam purlins and the continuous sash in the saw-tooth monitors is set in a vertical position facing the north. The building is heated by means of a hot air blowing system installed by the Buffalo Forge Co., Buffalo, N. Y. The heating flues are suspended from the roof girders and have two-way openings at intervals of about 30 feet. The artificial lighting consists of individual incandescent lamps suspended from the roof purlins at a height of about 12 feet. The floor is of concrete and is on a level with the floors of the railroad cars that enter the shipping room.

The process of manufacturing enameled kitchen ware consists principally of stamping, pickling, enameling and burning. The sheets are received at the plant in lots of several thousand of each size, the thickness of the material ranging from No. 16 to No. 28 gage. Each stack of sheets in the stock room is labeled with the size, gage and the number of sheets, together with the car number in which they were received.

As the sheets are needed, a work card is issued to the men engaged on the circle shears, authorizing them to cut the required number of pieces to the shape specified on the work card. This work is done on machines manufactured by the E. W. Bliss Co., Brooklyn, N. Y. The sheet to be cut is placed between a male and female die, the corresponding edges of which are sufficiently close to produce a shearing action when the dies are brought together.

From the circle shears the rounds are trucked to the press department where they undergo the first stamping operation. The equipment in this department consists of over 30 presses of various sizes similar to those shown in Figs. 2 and 3. The heavy

FIG. 6—HOW THE KITCHEN WARE IS ENAMELED

FIG. 7—FRYING PANS EMERGING FROM THE OVENS

FIG. 8—A GRID LOADED WITH ENAMELED KETTLES WHICH HAVE JUST BEEN TAKEN FROM THE BURNING FURNACE. THE PIVOTED FORK AND FOUR-WHEELED TRUCK WHICH HANDLE THE GRID ARE CLEARLY SHOWN

machines, which were built by the E. W. Bliss Co., Brooklyn, N. Y., Williams, White & Co., Moline, Ill., and the Toledo Machine & Tool Co., Toledo, O., are on heavy foundations on either side of a shafting basement, as indicated in Fig. 11. This basement or tunnel extends underneath the floor between the machine foundations and contains two rows of concrete piers which carry the boxes for two countershafts. These shafts are belt-driven from motors resting on the floor of the stamping room, and the stamping presses are in turn driven by belts running from these shafts. The basement is well lighted and is connected with the room above by means of stairs leading to trap doors in the floor. This arrangement eliminates the noise and danger incident to belts running at high speeds on the working floor. Work cards accompany the circles to the stamping presses. If the shape of the article is comparatively simple and the depth of the draw is not excessive, one operation in the stamping department is sufficient. This is especially true of shallow shells such as covers for pails and kettles, frying pans, griddles and similar articles. The blank sheet and stamped pan

FIG. 9—A VIEW IN THE SHIPPING DEPARTMENT. NOTICE THAT THE FLOOR OF THE BUILDING IS AT THE HEIGHT OF THE CAR FLOORS. THE SUPPLY OF EXCELSIOR, STRAW AND PACKING BOXES FOR SHIPPING PURPOSES IS SHOWN AT THE RIGHT

shown in the foreground of Fig. 2 represent a typical job that requires only one drawing operation. More complicated utensils, including coffee pots, stewing pans, deep kettles, combinettes, etc., require from two to as many as six or seven drawings, depending largely upon the depth of the draw.

In the drawing operation, a blank sheet is placed on the lower die, the exact position of the blank being governed by a number of stops at the back of the die, which make it certain that the stamped article will be concentric. The dies come together, forcing the sheet to shape. In the case of shallow shells the dies are simple cast iron pieces which have been machined and finished to the shape of the stamped article, an allowance being made for the stretching of the metal at certain points. Articles having concave sides must be stamped with a male die equipped with an expanding device. In the case of a small kettle about 10 inches deep having concave walls, the upper die consists of four segments which enter the kettle as the plunger of the press starts on its downward stroke. As the bottom of this die strikes the shell, a tapered device is forced down between the inner edges of these four segments causing them to expand, forcing the sides of the kettle outward. As the plunger returns on its upward stroke the tapered rod rises, allowing the four segments to contract. The upper die is then drawn from the piece, and the machine is ready for another similar operation. This method of expanding the sides of a vessel is known as bulging.

The small work is stamped on a battery of nine single-acting presses made by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. These machines are driven from a countershaft and consist principally of a crank and connecting rod which drive a plunger and attached die up and down a pair of guides that are set at an angle of about 25 degrees from the vertical. Most of the work done on these machines consists of light stamping such as cutting ears and handles for kettles, spouts for coffee pots, handles for frying pans, etc. All the stamping machines are equipped with automatic counters manufactured by the W. N. Durant Co., Milwaukee, Wis.

Articles requiring more than one draw together with those subjected to unusual strains in a single draw must be annealed before they are stamped. The annealing furnace is approximately 15 feet long and consists of a number of gas burners, which feed a steady flame to a checker work system of refractory brick overhead. The top of the hearth is about 4 feet from the floor and at either side is a rail made of fire brick. The top of the furnace is semi-circular, as shown in Fig. 4. On either side of the furnace door is a rack constructed of heavy pipe, and directly in front of the furnace is a narrow gage track on which a four-wheeled truck runs. This truck carries a pivoted fork having two prongs, the handle portion of the fork being heavily counterweighted. When it is desired to anneal a lot of pans or kettles, they are stacked on a thin riveted grid which rests on one of the racks. When it has been loaded, the furnace operator runs the truck back, swings the prongs of the fork under the grid, and then by means of the counterweight, holds the grid and its contents in mid air while the truck is pushed toward the furnace. When the grid is directly over the hearth, it is lowered until it rests on the rails at either side. The fork is then removed and the furnace door lowered. While the contents of the furnace are being annealed, the operators may be loading up another grid preparatory to the next heat. The annealing process consumes about three or four minutes, the temperature of the furnace being constant at approximately 1,000 degrees, Fahr.

When the stamped articles come from the furnace they are covered with a thin black coat of scale which is removed by a laborer as he loads the articles into a hand truck. After the last stamping operation is completed, the products are taken to the spinning department. Here, a battery of 10 or 12 lathes, manufactured by E. G. Eldridge, Chicago, are engaged in spinning the stamped articles. This operation consists of placing the piece upon an arbor which corresponds in shape to the inside contour of the finished article. As the piece is revolved at high speed, a smooth roller is brought against the piece. This is applied at the bot-

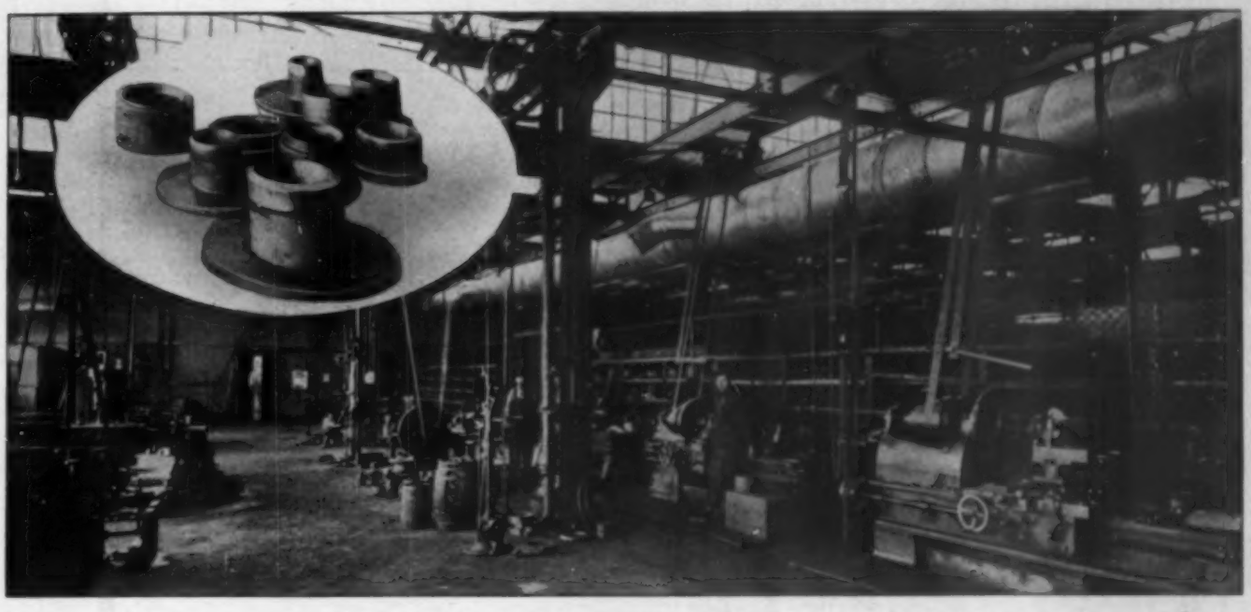


FIG. 10—A VIEW IN THE WELL EQUIPPED MACHINE SHOP. THE INSERT SHOWS A NUMBER OF DIES USED IN THE STAMPING PROCESS

tom of the article at first and is gradually worked toward the top edge. This operation smoothes out any wrinkles left by the stamping process and rolls all excess metal toward the top of the article. A sharp revolving cutter is then brought against the edge of the piece, cutting off the excess metal and leaving just enough stock for the beading, which is formed by means of a small concave roller that turns back the edge of the metal and bends it over.

The circle shears which first cut the sheets, and the spinning lathes which trim the edges, produce a considerable amount of scrap. This is gathered up in shop trucks and taken to the south end of the press room where it is fed into a motor-driven baling press manufactured by Logemann Bros., Milwaukee, Wis. The bales are formed under a pressure of about 2,400 pounds per square inch, and weigh from 50 to 100 pounds depending upon the character of the scrap. The baled scrap is trucked to the scales at the entrance to the shipping room and is stored until an amount sufficient for shipment has accumulated.

After being spun and trimmed, the stamped utensils go to the electric spot welding machines where the ears, handles, spouts and other trimmings are welded to the body of the article. The two welding machines in operation in this department were manufactured by the National Electric Welder Co., Warren, O. The larger one operates at 220 volts, 80 cycles and 30 kilowatts and the smaller at 220 volts, 60 cycles and 12½ kilowatts. Each machine is driven by a Western Electric Co. motor. These machines have reduced the cost of fastening small parts to kettles, pans, and pots, to a minimum and have eliminated the trouble previously experienced by the failure of soldered pieces to hold. The ears and handles, involving six welds on each kettle, are welded at a piece work rate of $0.15 per hundred kettles.

After the welding, the product of the press room is taken to the stock room, and from there it is trucked to the pickling room. It is first scaled or heated in a gas-fired furnace to burn off the oil and other substances which have accumulated on the surface during the stamping and spinning operations. After the articles have been in the furnace for a period of three or four minutes, they are removed by means of a fork as previously described. The pieces are piled into a crate suspended by chains from a shaft as shown in Fig. 5. When the crate is filled the shaft is released and lowered until its contents are immersed in a bath consisting of one part muriatic or sulphuric acid, and four parts water. The stamped ware remains in this mixture for about 50 minutes, and is then given two immersions in separate vats of water. After this treatment, it is plunged into a solution of soda, after which it is placed upon a slowly moving belt that carries it through a drying oven. Fig. 5 shows the arrangement of the pickling room equipment. It will be noticed that the steel work of the roof trusses, as well as the pipes and other metal work is protected from the acid fumes by a coating of concrete.

From the pickling room the work is carried to the enameling department, where each piece is really given three separate treatments of enamel. The enamel is prepared by a secret process in the smelting room at the northeast corner of the building. As the stamped articles come to the enameling department they are first inspected, the pickling and drying operations having cleaned each piece so that every flaw is easily discernible. After the defective pieces have been rejected, the others are dipped into

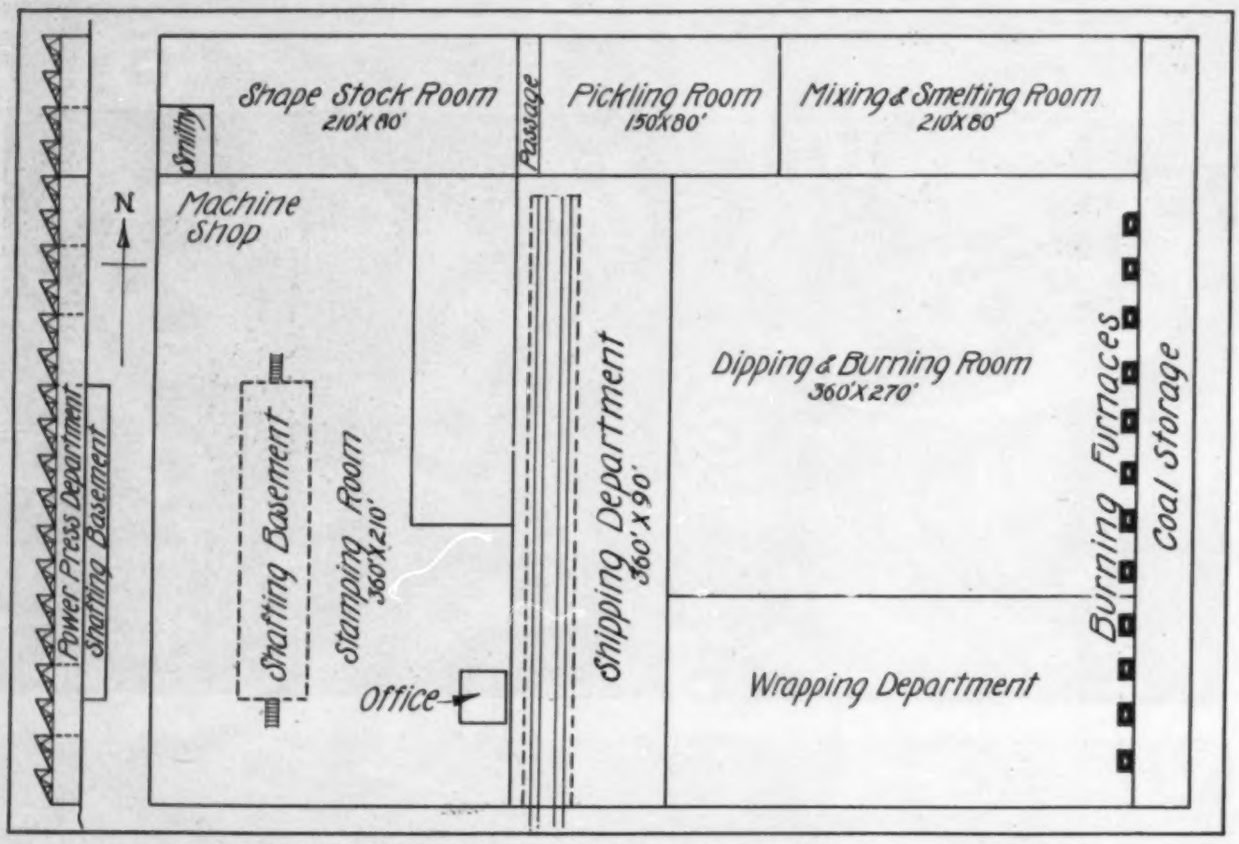


FIG. 11—PLAN AND ELEVATION OF PLANT OF AMERICAN STAMPING & ENAMELING CO.

a bath of black enamel, which gives the succeeding coats of enamel an affinity for the metal. As each piece is dipped in the enamel, it is handed to a helper who wipes the excess enamel from the edges and inserts two hooks under the rim. These hooks are fastened to a continuous chain which moves at the rate of about 10 feet per minute through a gas and hot air heated oven, similar to that shown in Fig. 7.

As the dried articles come from the ovens, they are placed in portable racks and moved to one of the 12 burning furnaces, shown in Fig. 8, which are arranged in a row at the east end of the building. The enameled pieces are transferred to a grid, similar to the one previously described, and are left in the furnace for only a minute, the temperature being from 1,500 to 1,600 degrees Fahr.

Conservation of Heat

These burning furnaces are coal fired, the coal being fed through two small openings at the back of each furnace. A fine lump coal known as Pittsburgh No. 8 is used. The furnaces are arranged so that the heat which rises above the chamber over the hearth is drawn into a large flue by means of a No. 9 Sirocco blower manufactured by the American Blower Co., Detroit. This hot air is directed through an underground tunnel to the drying ovens in the dipping department where it assists in drying the enameled pieces which pass through the oven suspended from the continuous chains.

The articles that have been burned are trucked back to the second set of enameling vats, where they are dipped into the second coat of enamel. After passing through the drying oven, as shown in Fig. 7, they are again carried to the burning furnaces to be subjected to the heat for about one and one-half minutes. When cool they are trucked back to the enameling room to receive the third and final coating.

Most of the kitchen ware manufactured at this plant is given a plain white, blue or a mottled blue and white finish. In case of the plain white ware, the third enameling operation is similar to the first two, except that after the piece has been dipped and dried, it is again dipped or treated with black enamel which covers only the beading along the edge and the ears and handles. After this has been done, the article goes to the burning room for final treatment. If the ware is to be given a blue finish, the third enameling operation is similar except that the color of the bath is different. The mottled effect is obtained by first dipping the piece in white enamel, and then holding it in the path of drops of blue enamel thrown from a revolving brush which is operated by means of a crank. The operator because of his experience at this work is able to produce a beautiful effect, the important part of the operation being the even distribution of the blue enamel on the piece as it splatters from the brush. Fig. 6 shows a workman in the act of splashing the blue enamel on a pan which has just been dipped in white enamel.

The kitchen ware is exposed to the heat of the furnace for a period of two minutes in the final burning operation. As the articles come from the furnace, they are handled by workmen equipped with asbestos gloves. Each piece is placed right side up on a firm plate, and a conical shaped die is forced by hand down into the circular opening to press the edge of the piece into the shape of a perfect circle. Several of these dies are shown in the foreground of Fig. 8. This is necessary to overcome the warping effect of the various heat treatments which each piece passes through in the enameling and burning operations.

The finished enameled ware is trucked to the sorting and wrapping room. In this department each piece is sorted and labeled. Kettles, pails, and other articles are fitted up with bails and handles, and if necessary the covers are assembled. On account of the rough handling received in transit, the wrapping of material of this kind is a very important feature of the business, and it is essential that enameled edges do not strike each other when the articles are packed for shipment. Paper, excelsior and straw are used exclusively in the wrapping and packing departments, as indicated in Fig. 9.

Packing and Shipping

The packing and shipping room surrounds two tracks which enter the building from the south. The finished product comes from the wrapping room at the east, and is packed in boxes and labeled with shipping directions in the southern portion of the shipping room. Light knockdown wooden crates, and strawboard and corrugated board boxes are used for shipping the enameled ware.

The plant contains a spacious and well equipped machine shop, which is situated in the western part of the press room. The machine tools, including shapers, milling machines, drill presses, hack sawing machines and lathes are engaged on die work and repairs to the stamping presses. A long line of benches, with vises and bench tools, provide facilities for the great amount of hand work required in finishing some of the more complicated dies. Eight men are steadily employed in the machine shop. Fig. 10 shows a group of machines in the eastern portion of the machine shop. Other auxiliary departments are the blacksmith shop, a small room at the north of the machine shop, and a transformer room, where the electric current furnished by the Northern Ohio Traction & Light Co., is reduced to the proper voltage for use in the plant. The switchboard which controls the light and power lines in all departments is in this room.

Companies Merge in 1913

The American Stamping & Enameling Co. was the result of the consolidation in August, 1913, of the Ohio Valley Enameling & Stamping Co., the Novelty Stamping Co., and the Enterprise Enameling & Stamping Co., all of Bellaire, O. Work on the Massillon plant was commenced early in 1915 and the press room was put in operation Jan. 1, 1916. On May 1, the first enameling work was started in the new plant. At present the stamping and enameling departments are operating at only a fraction of their ultimate capacity. New machines and additional dipping equipment, which will gradually increase the output, are being installed daily. The press room is now turning out an average of 13,000 pieces each day, which is about 30 per cent of the calculated output of the plant. Approximately half of the output of the press room is enameled in the Massillon plant and the remainder is shipped to Bellaire to be finished.

The American Stamping & Enameling Co. was organized and financed by the Geiger Jones Co., Canton, O. The officers of the company are M. L. Blackburn, president; W. T. Hughes, vice president; and V. P. Leister, secretary and treasurer. H. C. Dowds is sales manager and W. T. Hughes is general manager of the Massillon plant.

Three kinds of accidents cost workmen in lost wages in the state of Wisconsin, last year, approximately $800,000. Eye injuries and accidents due to flying chips and materials caused a loss of $323,000. Three hundred thousand dollars were lost by workmen falling from insecure places as ladders, scaffolds, etc. Wages lost through objects falling from cranes and overhead scaffolds amounted to $195,000.

Preventing the Corrosion of Pipe

The Life of Pipe in Sprinkling and Hot Water Heating and Supply Systems Varies from Five to More Than Twenty-Five Years—Developments in Metallurgy and Manufacture Promise to Add 50 or 100 Per Cent to This Period

BY F. N. SPELLER

CASUAL observation will show very marked differences in the degree of corrosion of pipe in service. For instance, hot water heating systems and sprinkler systems show practically no deterioration in service after 25 years, while low pressure steam returns sometimes give trouble after 15 years' service or less. Galvanized pipe in hot water supply systems, where the water is heated under pressure, lasts from about five years upwards, depending on the temperature and quality of the water and volume of flow. The last named condition is also severe on iron and steel pipe. These few instances are the extremes, but are surely suggestive when we consider that in pipe carrying ordinary water under some conditions there is no apparent deterioration in a generation; whereas in other cases, the same grade of pipe is seriously damaged in a very few years. A few illustrations of the present condition of old sprinkler lines after long service are shown in Figs. 1 and 2.

Some years ago, when steel pipe was comparatively unknown and not fully developed, it was natural to question this material, but comparisons of the modern wrought iron and steel pipe in the same lines in service have shown beyond any question that where corrosion is found one material suffers on the average as much as the other.

Corrosion Tests of Pipe

It has been the custom of the writer to keep several service tests under way continuously for the past few years. In every case the cooperation of some local engineer or organization is sought under whose immediate direction the test is conducted. One of the most recent to be completed may be described as an example of the method pursued in conducting such tests. This test was made in the Pennsylvania building, Philadelphia, Mr. Munsey, engineer. Four standard grades of pipe of well known manufacture were selected and four pieces of each taken at random and coupled together alternately so that the hot water passed through each sample at the same temperature. The pipe used in the tests was taken from the hot water return line, installed in the form of a box coil Oct. 27, 1913, and was removed Nov. 20, 1915. The temperature of the water averaged 175 degrees Fahr. The calculated amount of water passing through the pipe was 5,000 gallons per day for 600 days. The details of the test are shown in an accompanying table.

The inside of pipe is subject to peculiar conditions not to be compared with external corrosion, and the inside surface is particularly vulnerable in that protective coatings are difficult to apply, therefore more liable to be defective.

Oxygen Causes Corrosion

Consider for a moment the situation in a hot water heating system and a hot water supply system where the temperature of the water is about the same. It is evident that the water alone is not responsible for the results observed, but rather something brought in with the water. The hot water heating lines have started to rust and then the action has apparently stopped, while in hot water supply lines the action is continuous and rapid: so much so, that if the pipe does not fail by leaking it may be plugged up tight with the reddish hydroxide of iron. The only way to account for this accumulation of oxide of iron is through the oxygen in solution in the cold feed water, amounting to 6 to 10 cubic centimeters per liter according to the temperature and quality of the water. This very small percentage of oxygen is apparently the measure of the destructive power of the water and accounts for the fact that a limited volume of water has no serious action on iron, whereas when this water is renewed continually, especially when heated, the results are liable to be most disastrous. It will be useful to consider the mechanism of corrosion before discussing ways and means for preventing this action.

All water supplies carry more or less foreign matter in solution. What are usually considered the purest natural water supplies are generally saturated with oxygen and carbonic acid, which cause such waters to be very corrosive particularly when heated. Iron in all its forms is soluble in water to the amount of a few parts per million, depending on its composition and that of the water. In this treatise, in referring to water in connection with corrosion, it will be understood to include domestic supplies of the usual degree of purity. Chemically pure water does not occur in nature, and therefore may be omitted from consideration.

The phenomenon of solution is now generally explained as an electrochemical reaction. When pieces of zinc and copper are connected together and suspended in water, a current of electricity starts to flow through the water from the zinc to the copper. The zinc is termed the anode and the copper the cathode. While the current flows the zinc goes into solution, the amount dissolved being proportional to the current according to Faraday's Law.

If we replace the zinc with a piece of iron, a current flows in the same direction and iron will be found in solution. Suppose we now replace the copper with another piece of iron. A small current of electricity will still flow, but not necessarily in the same direction, this depending upon the relative surface condition of the two pieces of iron.

Effect of Electrolysis

It is this small current flowing between one piece of iron and another under water which causes iron to enter solution, and this is now recognized as the *initial reaction of corrosion*. Solution is hastened by carbonic acid and mineral salts in solution, as these make the water a better electrolyte. However, it has been proved that iron will dissolve to some extent in the purest water that has yet been made. If the iron is exposed to nothing but water this reaction will soon cease, due to the accumulation of hydrogen at the cathode causing polarization; and this is what actually happens in practice in hot water heating and other systems in which the water and consequently the supply of free oxygen is

Presented at the recent annual meeting of the American Society of Heating and Ventilating Engineers.

not renewed. On the other hand, when oxygen is present it combines with the hydrogen, depolarizing the surface of the iron and thus causing solution of the iron to continue. Oxygen enters further into the reaction by combining with the ferrous hydroxide to form insoluble ferric hydroxide, generally known as rust. With an unlimited supply of water and oxygen, corrosion will continue until the iron is all converted into the form of ferric hydroxide.

Theories of Corrosion

So far most of the authorities are agreed as to the cause of corrosion, although there has been considerable scientific argument as to whether a trace of carbonic acid (CO_2) is necessary or not for the solution of iron. For all practical purposes we can let this question rest and combine the acid and electrolytic theories into one, as outlined above, which affords the best explanation of the observed facts available at this time.

Ever since the electrochemical theory of corrosion was proposed by Whitney in 1903 there has been a division of opinion as to the cause of the difference of potential observed between two pices of iron. The majority at first assumed that this was due to variation in composition of the metal, and the manufacture of iron of a high degree of purity in the open hearth furnace was heralded with great expectations as to durability. So far, after several years of trial it has not been found that such iron is so well adapted for the manufacture of pipe as the grade of soft weldable steel now generally used for this purpose.

In the year 1904 the writer started a study of the potential differences as found on the surface of iron of various compositions, and has invariably found just as much difference in potential on the surface of very pure iron as on steel or wrought iron of ordinary commercial quality. Subsequent observations, covering several years of service with pure iron, open hearth and bessemer steel and wrought iron of the quality required for the manufacture of wrought pipe, have confirmed the conclusion expressed by the writer after his earlier experiments; namely, that composition has very little to do with the rate of corrosion of these metals under water. It should be remembered, however, that conditions of underground or inside pipe lines are not the same as they are when exposed, so that these conclusions do not apply to materials subjected directly to atmospheric conditions, such as metal roofing, which is another problem.

The tests and experiments referred to indicate that differences in finish and density of the material, particularly the character of the mill scale and how firmly it is attached, usually determine where corrosion starts and how it proceeds. The difference of potential due to surface influence was found to be many times greater than that due to variations in composition in the ordinary run of steel, and predominated over all other influences in nearly every case. These conclusions were tested in the most critical manner and have since been borne out by service tests of several years' duration.

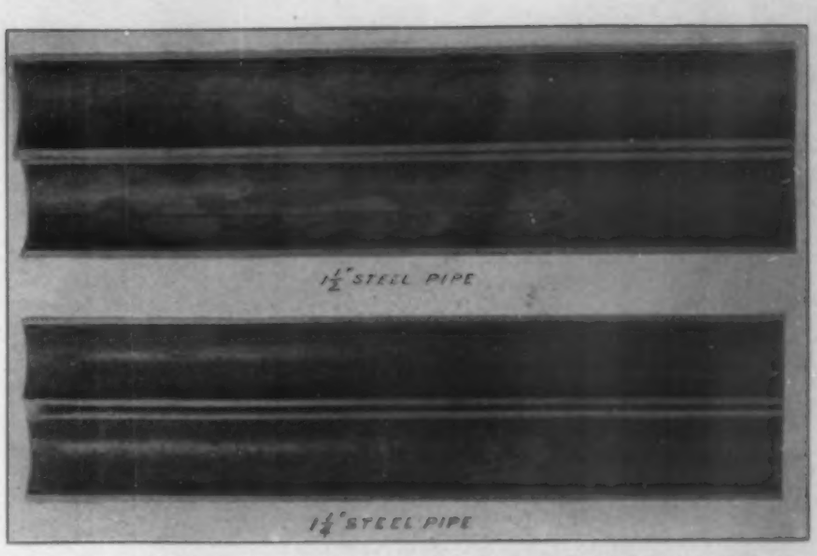


FIG. 2—STEEL PIPE REMOVED FROM EXTINGUISHER LINES IN SERVICE FROM 15 TO 25 YEARS

Explains Cause of Pitting

Among the surface influences which directed the course of corrosion it was found that rust, when once formed, was nearly as potent as mill scale in its effect on corrosion. Some recent work by Mr. James Aston, M. E. of the U. S. Bureau of Mines, confirms these conclusions, but goes further in showing that the influence of rust in some cases is to render the metal underneath the rust anodic. As the mill scale is always the cathode, there is every reason to believe that we may have in certain places on the surface nearly double the difference of potential which was expected and this without reference to the actual composition of the iron or variations thereof. Everything seems to point to this explanation of the cause of pitting as being the true one. Under some conditions of service in water lines or boilers it frequently happens that the tubes, which prove to be of a high standard of quality as regards chemical composition, structure and physical properties of the metal, have rapidly pitted through in places. The difference of potential and the current which thereby flowed from the exposed places to the firmly attached mill scale, especially after the exposed metal becomes covered with rust, affords a satisfactory explanation of the rapid pitting observed in such cases. The current flowing between two points on the surface of a piece of

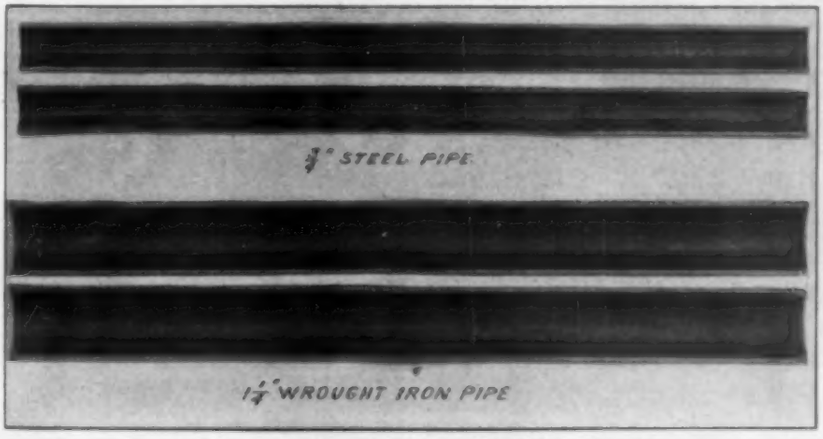


FIG. 1—SAMPLES OF PIPE REMOVED FROM OLD SPRINKLER LINES

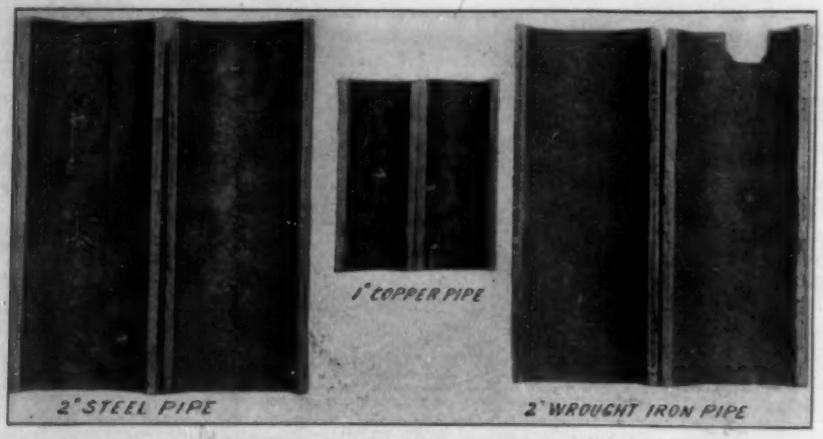


FIG. 3—WROUGHT IRON AND STEEL PIPE TAKEN FROM AN OPEN HEATING SYSTEM. THE COPPER PIPE WAS TAKEN FROM A CLOSED HEATING SYSTEM AFTER ONLY SIX MONTHS SERVICE

iron is very difficult to measure accurately; however, we have frequently observed currents as high as one milli-ampere flowing between steel electrodes in McKeesport city water, one plate being clean and the other covered with mill scale. Some typical readings between plates of the same area made with a milli-ammeter having an internal resistance of eight ohms are shown in the table below.

It might seem at first that these currents are too small to cause serious damage. A rough calculation based on these experiments will indicate the ultimate result from such currents acting continuously with certain submerged areas of electrodes. One ampere acting for 6 months, will dissolve 10 pounds of iron, or a plate 12 x 12 x ¼ inches. One milli-ampere acting for six months, will dissolve 0.144 square inches of this plate, making a hole about 7/16-inch in diameter x ¼-inch deep. On the other hand 0.1 milli-ampere acting for 60 months, will perforate this plate with a hole of the same size. This rate of pitting is not so far different from that experienced under some conditions of service. The remedy seems to lie in the elimination of dissolved oxygen from water before use. This may be accomplished in practice in at least two ways, by allowing the hot water to come to rest for a few minutes under greatly reduced pressure or by fixing the free oxygen. As no reliable data could be found on the amount of oxygen retained in solution in water at various temperatures and pressures, a series of experiments were run to determine these constants. Evidently the pressure must be reduced below normal or the temperature raised nearly to the boiling point with the water at atmospheric pressure to get proper separation of oxygen and other gases.

Fig. 3 illustrates some 2-inch wrought iron and steel pipe (galvanized) after 13 years in an "open" heating system in the Columbia Baths, Atlantic City, N. J. The small pipe in the same picture shows the condition of some copper pipe used under the same conditions in a "closed" heating system for only six months. At the Columbia Baths the salt water was heated to about 180 degrees Fahr. in an open tank from which it was run by gravity to the system. This pipe was in continuous use during the season for this period. The galvanized pipe was practically as good as new, showing that even salt water is practically harmless when de-aerated to this extent.

An alternative method of reducing corrosion in water lines by satisfying or "fixing" the free oxygen was tried out by the writer several years ago, using clean iron turnings. It was found difficult to get the scrap free from oil, and after rusting had progressed for some time there was a tendency for the mass to cake together and so impede the flow. By using sheet iron, so formed as to provide a large number of channels with about ¼-inch clear passage through which the hot water slowly percolates, we expect that these difficulties will be overcome. The rate of rusting varies with the surface condition of the plates, becoming more rapid as the surface is covered with a good coating of oxide. The speed of rusting is 50 per cent more rapid at 110 pounds per square inch pressure than at atmospheric pressure, and, of course, the time required to "fix" the free oxygen of the water varies with the amount of surface of metal exposed per cubic foot and other conditions which are liable to vary.

On this principle, two small plants have been equipped to carry out this method of treatment in practice. These systems were installed at places where considerable trouble has already been developed through the clogging and corrosion of galvanized pipes.

These plants, which have only been operating a short time, show a reduction of oxygen contents from 8 or 9 cubic centimeters per liter to 0.1 to 1 cubic centimeter per liter according to the rate of flow and temperature. At present it seems desirable to design the plant so that the oxygen contents will be less than 1 cubic centimeter per liter at all times, at which point corrosion seems to be reduced to a negligible amount. Some more definite data on this point will be available after these plants have been in operation for several months. The indications are that the rate of rusting of the plates, and hence the efficiency of the apparatus, will increase with time. Water should be in contact with the plates for at least ten minutes.

Similarly, the corrosion of low pressure steam lines will be found to depend principally on the amount of oxygen which finds access to the system. The return lines naturally suffer the most and are usually the first to show failure. Condensed water when freed from oxygen in solution is harmless, and will not even tarnish

Corrosion Measurements

Lot	Material.	Depth of pitting in inches. Average of 10 deepest pits in each piece.	Deepest pit.
A	Steel	0.068	0.094
A	Steel	0.087	0.124
A	Steel	0.045	0.050
A	Steel	0.063	0.074
B	Steel	0.079	0.104
B	Steel	0.056	0.094
B	Steel	0.054	0.065
B	Steel	0.070	0.081
C	Iron	0.065	0.073
C	Iron	0.072	0.097
C	Iron	0.078	0.105
C	Iron	0.077	0.080
D	Iron	0.055	0.075
D	Iron	0.067	0.112
D	Iron	0.067	0.078
D	Iron	0.073	0.090
		General average.	
A	Steel	0.066	0.085
B	Steel	0.067	0.086
C	Iron	0.073	0.089
D	Iron	0.066	0.088

Electrolyte, McKeesport City Water

Submerged area of plate in sq. in.	Current in milli-amps.	Current divided by the square root of the area of plate.	Distance between plates.
0.155	0.07	0.18	1
0.338	0.10	0.16	1
1.643	0.25	0.20	1
3.875	0.48	0.24	1
16.430	0.98	0.24	1
0.062	0.06-0.09	....	½
0.342	0.14-0.18	....	½
16.430	2.02	....	½

bright iron after months of exposure; but this water, on account of its great purity, has greater capacity for solution of oxygen than the average natural water and is therefore apt to be very corrosive when aerated. This may be prevented in large measure by using an open feed water heater and keeping the water over 185 degrees Fahr.

Oil Has Proved Satisfactory

In some cases the surface of the pipe may be protected with a film of oil deposited from the steam. The writer's attention was recently called to the satisfactory results obtained in some buildings using exhaust steam which on investigation was accounted for by the thin film of oil found on the inside of these pipes. This was such an interesting matter that we made some tests in the research laboratory on long lines of new pipe and found that mineral lubricating oil, when dropped into a pipe carrying steam under pressure at the rate of two drops per minute, was carried forward in a fine state of division and in a few minutes was found condensed in a uniform film in the pipe about 160 feet from the lubricator. While this simple means of protection would perhaps be objectionable in some cases, there are many steam heating systems where the oil could do no harm and might result in considerably prolonging the life of the lines. Of course, nothing but a good grade of mineral lubricating oil should be used, and the supply should be regulated by a reliable sight feed lubricator.

Summarizing very approximately, the influence of various factors on corrosion, it appears from the experience we have at present that developments in the metallurgy and manufacture of steel pipe promise to add 50 or perhaps 100 per cent to the life of pipe compared with the service obtained under like conditions 10 or 12 years ago.

Makes Long Solid Steel Shear Blades

Tinker & Sons Co., successor to Samuel Trethewey & Co., Ltd., Pittsburgh, manufacturer of solid steel shear knives, recently completed six knives which are said to be the largest ever made in this country. The company has filled a contract for the following shear knives, for shipment to an eastern rolling mill interest: Two 215-inch, four 194-inch and two 172-inch knives, all 8¼ inches wide and 2⅝ inches thick at the base. Each of the 215-inch knives weighs 1,500 pounds. It is said that the longest shear blade previously made in this country was 192 inches in length, or 23 inches shorter than two of the blades recently made by the Tinker company.

TEN LONG SHEAR BLADES READY FOR SHIPMENT

Another order for two 131-inch shear knives for shipment to a steel works in Japan was received some time ago by the company. These knives are 10½ inches wide and 2⅝ inches thick. The accompanying illustration shows 10 knives manufactured by the Tinker company ready for shipment. The combined weight of the shear knives is 12,000 pounds. The company, which was organized in 1883, has been running at maximum capacity for many months and has a large volume of business on its books.

Overcoming Chatter Marks

BY H. W. DUNBAR

MANY users of grinding machines believe that chatter marks are caused by gearing in the headstock, and to the uninitiated this sounds feasible. However, those who have spent years of experimenting and investigating on grinding problems, have long since discovered that chatter marks are usually due to other causes and that only occasionally can they be charged to the gears.

While imperfect gearing may cause marks in the work in some instances, it is more often the case that the gearing is correct, and that chatter is caused by something entirely different. Marks are often evident in a ground piece of work without the aid of a microscope or a lap, and may be distinguished at a distance of several feet from the work. Then again, other chatter marks can not be detected under the most careful scrutiny until they have been lapped with a perfect lap, which polishes the high spots and brings out the furrows. These tiny indentations are evident in work accomplished by any known drive and are generally known as invisible chatter marks.

The kind of marks which are clearly evident on the surface, without any mechanical means for bringing them out, are apt to appear in any form of drive, but can be avoided by observing certain laws and principles.

Users of grinding wheels will find that in many cases, their troubles can be traced to one of the following sources all of which have been known to cause chatter marks.

1. *Improper speed relation between wheel and work.* Speed of revolution is important and cannot be ignored no matter what the design of the machine or the method of driving. The proper speed of revolution and the proper wheel must be selected if imperfections in grinding are to be prevented.

2. *Improper use and an insufficient number of steadyrests.* If the work itself vibrates while the wheel is rubbing upon it, these vibrations will cause im-

From "Grits and Grinds," published by the Norton Co., Worcester, Mass.

perfections. Sometimes they will be visible to the eye; other times they can only be detected by lapping. The only way to overcome this vibrating motion is to use firm steady rests, and not until they do become firm can the work be accomplished efficiently.

3. *Vibrations of steadyrest shoes because they are loose in the holder.*

4. *Uneven thickness of belt driving the wheel or the work.* Each uneven spot on the belt transmits a vibration to the spindle, which in turn transmits it to the work. It can readily be seen what the effect will be if a large number of these places exist on a belt. The only remedy in a case like this is to true the belt to a uniform thickness with a carpenter's chisel or scraper.

5. *Poorly cut gears unevenly spaced and rough on the face.* These defects are seldom found in a geared headstock, unless through a negligent inspection.

6. *Improperly trued wheel.* The wheel must be trued perfectly round and straight on the face. If otherwise, the character of the work turned out will probably be in proportion to the workmanship on the wheel.

7. *Poorly fitting centers.* Centers that do not fit in the taper perfectly will vibrate and cause chatter marks. Loose centers and centers that are not round. centers in which the taper in the center hole is greater than the taper on the center point, centers not properly lubricated, etc., all tend to produce chatter.

8. *Poor fit of surfaces on wheel slide.* This is a result of wear caused by moving the wheel slide back and forth in a small space for special work requiring only a short motion. Attempts to force production on machines too light for the work being ground causes practically the same result.

9. *Irregular rotation of work or wheel, caused by loose belts, change in voltage, slipping of belts, etc.*

10. *A change in the surface of the wheel.* If the wheel becomes glazed or filled at certain points a different action at different points in its cutting face will result. The wheel out of round, caused by its being brought up against the work without any lubricant, will produce the same results. In this case, parts of the face of the wheel are broken away and every spot leaves a mark on the work.

11. *Loose wheel spindle.* This is merely a case of adjustment.

12. *Wheel out of balance.* An unbalanced wheel causes vibrations through the entire machine.

13. *Weak driving pin.* A weak driving pin will not permit the work to be revolved with a uniform motion.

14. *Heavy unbalanced parts revolving at high speed.*

15. *Work not tight on the centers.*

16. *Wheel loose on wheel sleeve causing the wheel to slip.*

17. *Armature dynamically unbalanced.* Motors used in connection with the machine sometimes have unbalanced armatures which will tend to cause vibrations.

It is probably true that modern grinding machines would not be capable of great production, and would not hold their important position in the machine tool field, were it not for the geared head-stock. Gears and geared forms of drive are steadily increasing in number. Almost all efforts up to the present time on the part of users of grinding machines to substitute belts or other forms of drive for gears in the work drive—except where the work is very small and light, have only been temporary expedients, for sooner or later troubles arise from lack of power, lack of speed, or some other unforeseen source.

One manufacturer who has installed a specially designed headstock to provide a smooth uniform motion of revolution for the work drive, frankly admits that the only reason he desires to grind work free from small invisible chatter marks is to overcome the letters of complaint coming from customers who desire ground work free from these blemishes. He claims it is merely tradition which leads to the opposition to chatter marks.

All on Account of a Rain Storm

BY RALPH H. JONES

IT WAS a beastly morning. A heavy fog made life miserable. The few pedestrians bold enough to venture out into the streets were glad to take refuge in doorways and under lowered awnings when it finally started to rain. It rained with a vengeance. It was no gentle sizzle-sozzle, but a determined downpour, better known in that particular locality as a gully-washer.

The new open-hearth steel furnace in the plant of Henderson Bros. Co. was pouring a heat when the storm was at its height and the brilliant glow from the molten metal threw a weird light into the faces of the curious passers-by as they stopped and peered into the foundry.

High up on a platform above the furnace was the superintendent and a salesman from the concern which had placed the furnace. They were particularly interested in the operation of this huge piece of apparatus, for it was the first heat which the furnace had ever poured. The downpour on the outside continued with a vengeance.

Now the foundry building where this furnace was located was by no means new. The certain ravages of time, coupled with acid-bearing fumes from a cupola had played havoc with a none-too-well-made roof, and the beating rain was finding entrance. A drop or two seeped through and fell with a splutter and fizz on the roof of the furnace. The superintendent and the other observer were occupied watching the swift-running metal. Another drop came through, then several and as the rain continued with apparently increasing violence, it was not long until a little steam cloud rose from the furnace roof. Then it was noticed, the cause ascertained and immediate orders given for the repair of the roof when the storm was over.

Mike, jack-of-all-trades about the foundry, had other duties when the storm was over, much more important duties to his mind than fixing a roof which was inclined to be slippery. So the appointed task went undone. Then it came pouring time again, and since there was no tell-tale rain, the superintendent neglected to ask whether the roof had been repaired in accordance with his earlier orders and the matter was forgotten, and it so happened that at 6 p. m. the following day, two hours after the last heat had been taken off, another hard rain pelted the foundry roof. It found the hole, once ordered repaired, and proceeded to enter. It dropped straight down on a 1-inch guy rod running the full length of the furnace on the charging side. It continued to pour and at 7 o'clock that evening the rod snapped. Both furnace ends gave way, one end yielding about two inches.

The rod had been so hot that the contraction was unusually severe, causing it to give way at its weakest point, namely a weld about 14 inches from one end of the furnace. Scientists, and practical men as well, might have puzzled long and wearily over the problem of what caused the rod to break three hours after the last heat was out. Phrenologists may well puzzle over the equally queer problem of a foundry superintendent who, though his furnace had to be closed down for three days for repairs, allowed the hole in the roof to remain a hole for over a month after the accident.

Phenomena of Ghosts in Forgings

The Following Article is Probably One of the Most Complete and Thorough Discussions of the Cause and Effect of Ghost Lines in Large Steel Forgings Which Has Ever Been Published

BY J. O. ARNOLD

DURING the past 20 years the author has occasionally been requested to investigate the phenomena of ghosts in forgings from large steel ingots, ranging in weight from about 40 to 80 tons. An exact knowledge of the method of formation

FIG. 1—SEGREGATED AREA IN INGOT

and the nature of ghost lines is a matter of great importance both to steel metallurgists and to naval engineers.

In 1894 the author and Rudolf Leffler, associate in metallurgy of the University of Sheffield, made a pioneer investigation of the nature of the ghost lines in a large steel forging made from a 40-ton ingot, from the upper portion of which about 30 per cent had been cut away for scrap. During turning operations the ghost lines in this forging, which were of a very decisive character, showed up white and in slight relief against the steel gray color of the mass of the turned forging. When exposed to the sulphurous atmosphere of Sheffield over the week-end, the white ghost lines turned light brown owing to oxidation. By means of a fine and sharp engraver's tool a number of the ghost lines were dug out, and similar minute excavations were made on parallel lines on portions of the forging free from ghosts. Of course, the shavings taken along the ghost lines contained some steel free from the effects of ghosts. The two sets of shavings on analysis registered the following figures:

	Ghost free portions, per cent.	Portions showing ghosts, per cent.
Carbon	0.320	0.380
Silicon	0.080	0.310
Manganese	0.680	0.920
Sulphur	0.020	0.045
Phosphorus	0.035	0.050

These figures show that the inclusion in the steel shavings of some ghost lines had raised the carbon 19, the silicon 287, the manganese 35, the sulphur 125, and the phosphorus 44 per cent, the ghost-free figures being taken as 100 per cent.

Micrographic Examination

The miscrostructure of the ghost lines showed the presence of excessive streaks of dove-gray sulphide of manganese, and of excessive carbon in the form of troostitic pearlite, which caused the ghost to etch dark brown, indeed almost approaching black. Greenish vitreous streaks of Stead's silicate of manganese, or possibly bi-silicate of manganese and aluminum, were also present, causing the notably high silicon and manganese in the steel shavings containing the ghost.

It is now obvious that the elements showing true segregation were carbon, sulphur and phosphorus, while the silicates probably formed while the steel was running down the lander from the furnace, and were incidentally involved in the steel. The author will hereafter exhibit titanic ghosts almost free from silicates. In these circumstances it is most unfortunate that the true migratory elements are usually included in the general and inaccurate term slag inclusions. The latter are either accidental or incidental, while sulphide of manganese is an absolutely normal and unavoidable constituent of all steels, excepting high-speed tool steels, in which the sulphur exists in solid solution as non-injurious sulphide of tungsten (WS_2), a fact ascertained in a semi-private but somewhat extensively circulated research.

FIG. 2—SECTIONAL ELEVATION AND PLAN OF DECARBONIZED GHOST LINE IN ANNEALED FORGING

In the big ingot, irrespective of the liquidated and scrapped upper third, in parts of which the phosphorus, for instance, may exceed 1 per cent, there is always more or less of a segregation of the mobile elements, carbon, sulphur and phosphorus to a series of centers. Investigations on the diffusion of elements in iron, carried out at Sheffield University, indicated the mobility of carbon to be about five times as great as that of sulphur, phosphorus and nickel. The

FIG. 3—TEST BAR USED IN STATIC TORSION TEST

The author of this paper, which was read at a meeting of the English Institute of Mechanical Engineers, is professor of metallurgy at the University of Sheffield.

Table I

Results of Tensile Tests

Mark.	Yield point, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.	Fracture.
4200 F G4	18.32	30.20	35.5	59.74	Fine gray granular.
4200 F G5	16.30	30.84	35.5	52.17	Fine gray granular.
4200 F B1	15.00	30.20	35.0	60.41	Fine gray granular.
4200 F B4	15.40	32.80	37.0	65.14	Fine gray granular.

upper photomicrograph in Fig. 1 shows a dark etching nodular segregation area. This consists of iron containing an undue proportion of (*a*) an isomorphous mixture of the double carbides of iron and manganese (xFe_3C, yMn_3C); (*b*) dissolved phosphide of iron (Fe_3P); and (*c*) small segregated irregular globules of sulphide of manganese (MnS). On forging the ingot the angular or martensitic structure is broken up, while the nodular segregate is drawn out into a dark-etching rod as also shown in Fig. 1.

Explanation of Why the Ghosts are Visible

In such a forging the elongated segregation, which is relatively hard, is jumped by the tool in turning operations, leaving in faint relief a relatively white line. During the prolonged cooling at a low red heat, the carbonized ghost becomes decarburized, the dissolved phosphide of iron seeming to expel the hardenite (transformed pearlite) to the edges of the ghost line, the final product being the decarburized ghost line, as exemplified in Fig. 2. Here the ghost has become essentially a broken and irregular cylinder of pearlite, filled with pale brown etching ferrite containing emulsified phosphide of iron, through which is scattered short rods of dove-gray sulphide of manganese.

The author was requested to decide whether or not the presence of moderately large ghost lines in a propeller shaft, forged from the lower end of an 80-ton ingot, was mechanically dangerous under torsional stresses and strains. The shaft was sampled so as to get sets of test bars visually containing well-marked ghost lines, all such samples being marked *B* and similar sets exhibiting hardly any ghost lines, these latter samples being marked *C*. On this basis two pairs were taken for tension tests, two pairs for torsion tests, and six pairs for alternating-stress tests. From these test-bars seven pairs of sections were cut out for microscopical examination. The results indicated that ghosts are formed in large ingots by segregation in the following manner: Just before the ingot solidifies, a definite alloy of iron with sulphide of manganese freezes out from solution and segregates to a series of centers. These frozen masses seem to form pivots, around which gather the migratory elements of steel, namely, carbon, sulphur, phosphorus, and, if present, nickel. Thus is obtained a more or less globular compound segregate, which is somewhat variable in composition, but with an average constitution approximately as follows:

	Comp. of main mass of ingot, per cent.	Comp. of Ghost globules, per cent.
Carbon	0.30	0.39
Sulphur	0.04	0.12
Phosphorus	0.04	0.10

On forging, the ghost globules relatively high in carbon, sulphur and phosphorus are drawn out into strings, which, on turning, exhibit themselves as the well-known ghost lines. In an annealed shaft such as that now under consideration, these ghost lines are always white when viewed under the microscope. The ghost line is, in fact, a streak of iron free from carbon, but containing in solid solution, and hence invisible, the phosphide of iron, which has expelled the carbon to the edge of the ghost. The sulphur is scattered through the iron of the ghost in the form of dove-gray streaks of manganese-sulphide. I may point out that ghost lines can never be eradicated from large masses of forged steel until metallurgical science has entirely eliminated sulphur from steel. This, I fear, will not happen in our time, if ever.

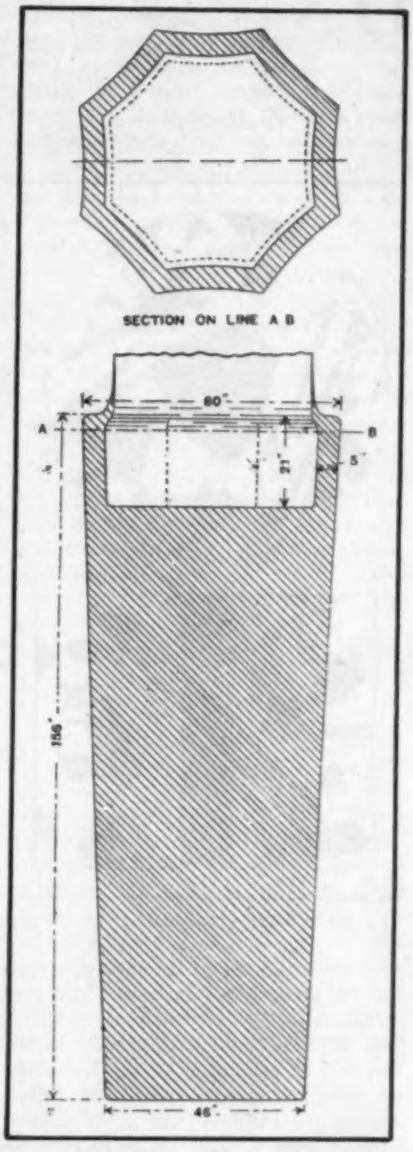


FIG. 4—MILD STEEL, CHROME-NICKEL, WEIGHT ABOUT 57 TONS

White ghosts, as already pointed out, are a succession of streaks of carbonless iron containing about 0.10 per cent of dissolved phosphorus and about the same percentage of sulphur, the latter presented as visible streaks of sulphide of manganese. A rough and ready rule to convert the percentage of sulphur by

Table II

Results of Torsion Tests

Mark.	Stress endured in inch-lb.	Angles of rotation endured, degrees.	Remarks.
4200 F G7	7,721	1,745	Previous to testing, a straight ink line was ruled along each test-bar.
4200 F G6	7,459	1,578	The spirals on the fractured bars mark the torsional movement during the testing operations.
4200 F B5	7,647	1,909	
4200 F B7	7,425	1,631	(See example in Fig. 3.)

weight into percentage of sulphide of manganese by volume is to multiply by five, hence the volume percentage of manganese sulphide in ghosts generally

FIG. 5 — TRANSVERSE SECTION OF FROZEN GHOSTS WHICH HAVE PROTRUDED INTO THE FLUID METAL

is about 0.5 to 0.6 per cent. It should, however, be remembered that the volume of the alloy of iron and sulphide of the manganese which first froze out would constitute several per cent of the mass of the ghost.

So far as my experience goes, ghost lines are little detrimental to the mechanical properties of structural steel, so long as the plane of stress is at right angles to the direction of the ghost lines—in other words, when the material is in tension, torsion, or under alternating stresses.

With a reasonable factor of safety (say 3½ to 1 on the elastic limit) I have never heard of a propeller shaft breaking in tension or torsion, but always under alternating stresses, the plane of rupture being at right angles to the ghost lines and on the theoretical plane of maximum stress at the out-

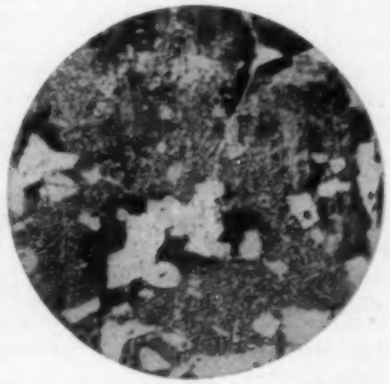


FIG. 6 — TRANSVERSE SECTION OF NON-SEGREGATED STEEL IN THE VICINITY OF FROZEN GHOST

board end of the boat, say about 1 inch aft of the propeller boss. With such fractures ghosts have little or no connection. All the pieces used in the static tension tests were 2-inches parallel, 0.564-inch diameter, 0.26-inch square area.

The figures in the foregoing Table I all denote a structural steel of very good quality and of generally even texture. Any slight variations are due to the fact that in annealing such shafts the texture of the pearlite (steel area) always varies a little, some regions being somewhat more laminated and hence milder than others. Extensometer tests were taken on each test bar, and a typical curve was plotted, in which the true elastic limit is indicated about 14 tons per square inch, and the yield, or breakdown point, at about 17 tons per square inch. All bars used in the static torsion test were 6 inches parallel, and 0.8-inch diameter, or 0.5-square inch in area.

Table III

Results of Dynamic Stress Tests

Mark.	First test.	Second test.	Mean.	Grand mean.
G1	254	258	256	
G2	258	230	244	
G3	250	252	251	246
$G1_2$	264	232	248	
$G2_2$	254	240	247	
$G3_2$	230	230	230	
B2	282	254	268	
B3	244	264	254	
B5	286	280	283	278
$B2_2$	298	290	294	
$B3_2$	294	282	288	
$B5_2$	248	274	261	

How Stresses Were Determined

The dynamic or alternating - stress tests were made on an Arnold stress-strain machine under standard conditions, namely, burnished test bars 6 inches long, by ⅜-inch diameter; distance from zero of stress to plane of maximum stress, 3 inches; deflection at zero of stress, ⅛-inch each way; rate of alternation, 650 per minute. The results are embodied in Table III. The grand means of each include 12 tests each.

Curiously enough, the samples selected as having marked ghost lines give better results. The tests present nothing remarkable, being such as are generally given by a shaft forged from a large ingot and subsequently moderately annealed. The absence of over annealing in the sense of cooling too slowly may be demonstrated by a stress-strain diagram.

An examination of the fractures of the whole of the test pieces, namely, eight in tension, eight in torsion, and 48 in alternation, exhibited at the respective points of rupture no signs of cracking or opening due to ghost lines, or to any other cause. I am therefore of the opinion that no risk would be incurred by putting similar shafts into vessels.

Comparatively recently the author had an opportunity of ascertaining the exact nature of unforged ghosts, some of which were about ⅜-inch in diameter and 9 inches long. The details of the extraordinary circumstances in which these gigantic ghosts were obtained, to the number of perhaps 50, are as follows:

A mild steel chrome-nickel ingot, weighing together with its feeding head about 57 tons, was being cast, and the casting was just completed when a break-out occurred at the bottom. The time record is as follows:—Casting was commenced at 8:57 p. m., steel entered the feeding head at 9:23 p. m., and the casting was finished at 9:28 p. m. The break-out occurred five minutes later at 9:33, but was stopped at about 9:35 p. m. When cold it was found that the ingot was hollow for 21 inches down, having bled about 17 tons of steel. The ingot was 60-inches octagon at the top by 46-inches octagon at the bottom, and 156 inches long. A sectional elevation and plan of the ingot is shown in Fig. 4. On cutting off the hollow portion of the ingot and then cutting this portion longitudinally into four pieces, a most extraordinary discovery was made. In each octagonal angle was found a series of protruding frozen ghosts. In Fig. 7, will be seen a reproduction one-fourth full size of these ghosts; the vertical line indicated the apex of this

Table IV

Analysis of Large Ghosts

Element	Disk drillings ghost free, per cent	Ghost chippings, per cent
Carbon	0.19	0.27
Manganese	0.53	0.57
Silicon	0.168	0.215
Sulphur	0.037	0.12
Phosphorus	0.028	0.082
Chromium	0.75	0.74
Nickel	3.74	4.42

particular octagonal angle. With so much material available it was easy to make an exhaustive chemical and microscopical examination of these ghosts; some of which were protruding to an extent of ⅜-inch. The surfaces of the steel free from ghosts showed decisive projecting indications of octahedral crystallization. The ghosts seemed to have caught on the angle where the body of the ingot turns upward to the feeding head, seeming to have been mechanically trapped on what may be termed a series of metallurgical futtock shrouds. Since formulating the futtock shroud theory to explain the irregularly drawn-out nature of the ghosts in the cast ingot, the author has made a further careful examination of the ghosts, and has come to the conclusion that the true explanation seems to be that after casting, at a position at the top of each ultimate ghost line, was a segregate of roughly globular form as shown in the top photomicrograph of Fig. 1. Then the rapid downward rush of many tons of molten steel when the break-out took place acted upon each pasty and more or less globular segregate in a manner similar to that of hammering or rolling, and drew them out into the elongated masses found grouped at each octagonal angle. The roughly globular rising masses of segregate all appear to have migrated into the angles, because the steel in those angles was at a higher temperature than the steel on the slightly radial sides of the octagon, the reason of this being that the solidified white-hot steel at the angles was thicker than that on the sides of the octagon, and hence more effectively lagged the fall of temperature at the angles, as compared with that taking place through the sides of the relatively cold mold. A complete set of ghosts from one angle was chipped away flush with the main body of the solidified shell of the ingot and was carefully analyzed. Drillings were also taken in a region free from ghosts, as indicated by the black disk in Fig. 7. The results are embodied in Table IV.

From the results shown in Table IV it is obvious that the ghosts are compound and variable segregates, marked segregations of carbon, sulphur, phosphorus and nickel having taken place. Previous investigations have showed that at about 1,000 degrees Cent. the elements of steel divided themselves into two groups, namely, migratory and non-migratory elements. The migratory group included the elements carbon, sulphur, phosphorus and nickel. Table IV shows that the conclusions arrived at for a temperature of 1,000 degrees Cent. also hold good for 1,500 degrees Cent., at which temperature the steel is fluid. The chemical figures are somewhat astounding. It has been generally accepted that ghosts, being higher in carbon, sulphur and phosphorus than the main mass of the steel, necessarily froze last. The data presented in this research, however, prove conclusively that the ghosts freeze first at many degrees above the main mass freezing point. Protrusions of frozen ghosts, some of them 9 inches long with projections into the fluid mass of ⅜-inch, are facts which cannot be disputed, although opposed to generally accepted theories. The behavior of nickel would seem to be connected with the theory that nickel, when present up to, say, 5 per cent, does not associate itself with the carbon, but forms a definite alloy

FIG. 7—GHOST LINES IN STEEL FORGINGS

Vertical Line Indicates the Apex of One of the Octagonal Angles in Which Ghost Lines Appeared. Black disc indicates where drillings were taken

with iron corresponding to the formula Fe_2Ni, and hence contains 13 per cent nickel. This nickelide of iron has, as received from the rolls, a yield-point of nearly 60 tons per square inch, a maximum stress of nearly 90 tons per square inch, associated with an elongation on 2 inches of 11 per cent and a reduction of area of 46 per cent. It is, therefore, perhaps the most remarkable metallic compound of iron.

Analysis of the Frozen Ghosts

Fig. 5 is a transverse section of frozen ghosts which had protruded into the fluid metal for ⅜-inch over a length of several inches, shown in Fig. 7. The structure consists of dark-etching cells of chromiferous and manganiferous pearlite, surrounded by pale thick cell walls of ferrite containing dissolved phosphide of iron. Throughout the latter are circular areas and streaks of sulphide of manganese, the latter running like broken rivers down the middle of the cell walls. The photomicrograph shown in Fig. 6 is a transverse section of the steel in the vicinity of the frozen ghost. The dark-etching areas are chromiferous and manganiferous pearlite; the pale areas are ferrite crystals exhibiting very sparingly circles and streaks of sulphide of manganese. The structure, as was to be expected in so large and hence slowly cooled an ingot, is intensely crystalline.

It has been shown that the existence of a definite solution or compound of iron and sulphide of manganese, which appeared to freeze before the main mass of the ingot, on cooling broke up into a mixture of iron and dots of sulphide of manganese. The composition of this mixture was tentatively suggested as 88 per cent Fe + 12 per cent MnS. Such a composition would be obviously of a relatively low specific gravity and would tend to rise through the still unfrozen main mass of the steel. The author suggests that as this definite substance rises in a thick pasty or semi-frozen state it forms in different parts of the ingot nuclei which gather to themselves the migratory compounds of steel, namely, carbide, phosphide, and in nickel steels, nickelide of iron. The author also suggests that the extraordinarily gigantic ghosts present in each octagonal angle of the bled ingot described in this paper were formed in the manner described.

Technical Periodicals

The National Carbon Co., Cleveland, has issued a periodical list of the technical publications to be found in the various Cleveland libraries. The pamphlet is modeled after the list of the technical periodicals to be found in New York City libraries which was published by the United Engineering Societies. The National Carbon Co.'s booklet includes the names of publications to be found in the public library, Case library, the library of Western Reserve University and the department libraries of Case School of Applied Science. It should prove valuable to Cleveland engineers. A separate list of the publications received and on file in the department libraries of Case School has also been issued and is available to engineers.

The state of California has made it unlawful for a workman not to use goggles in foundries, grinding and polishing rooms, workshops, etc. Employers are held responsible for not furnishing goggles to their employes.

Export Movement

Continues at Great Rate — Many Trucks Shipped Abroad.

Some additional information is now available in regard to imports and exports of iron and steel products in September. The exports of machinery for that month amounted to $20,508,455, compared with $24,657,597 in August, 1916, and $12,384,389 in September, 1915. Exports of motor trucks were valued at $5,203,215, the largest amount since last April. The exports of metal working machinery were valued at $7,901,328 in September, compared with $8,134,473 in August.

September exports of zinc, except ore and dross, were less than those for August, the value in September being $5,276,231, compared with $6,261,500 in August, and $3,257,835 in September, 1915.

EXPORTS OF MACHINERY.

1915.	Motor trucks.	Agricultural implements.	Aeroplanes.	Metal working machy.
June	$8,578,802	$854,670	$283,212	$3,735,562
July	6,803,001	963,534	880,836	3,872,358
Aug.	4,387,193	1,454,606	588,600	3,624,411
Sept.	5,882,255	1,092,797	101,950	3,363,973
Oct.	4,307,190	791,230	366,892	3,236,079
Nov.	3,837,307	1,054,235	13,770	4,644,713
Dec.	3,920,533	1,338,629	156,347	3,205,788
1916.				
Jan.	3,416,618	1,139,874	.....	3,249,595
Feb.	6,170,367	1,323,578	22,320	4,662,905
Mar.	4,909,179	2,287,605	8,400	6,501,022
April	5,259,480	2,066,512	.....	6,552,397
May	4,357,238	2,277,966	.....	9,935,806
June	3,551,148	1,793,355	20,000	8,465,985
July	3,062,670	2,016,091	10,000	7,814,691
Aug.	4,442,158	2,513,243	24,000	8,134,473
Sept.	5,203,215	1,804,475	5,000	7,901,328

IRON AND STEEL EXPORTS, GROSS TONS.

	September, 1916.	September, 1915.	Nine months ending September, 1916.	Nine months ending September, 1915.
Scrap	36,519	10,290	158,352	40,383
Pig iron ...	64,122	29,222	302,504	156,939
Billets, ingots and blooms of steel...	163,104	54,782	1,058,109	407,813
Wire rods..	10,793	17,909	118,419	121,546
Steel rails...	86,676	41,160	391,449	225,296
Steel bars...	64,168	37,636	589,199	296,331
Iron bars...	6,948	6,560	59,193	26,600
Struc. iron and steel..	29,336	26,714	211,869	165,084
Hoops, band and scroll.	4,556	3,145	34,145	19,046
Sheets and plates	44,583	47,649	370,908	320,043
Tin and terne plate	18,770	22,271	179,123	105,112
Barbed wire.	42,403	32,826	341,912	172,883
All oth. wire	23,363	21,659	211,561	168,064
Cut nails...	877	653	3,672	3,140
Wire nails..	15,369	9,565	114,709	66,576
All oth. nails incl. tacks	1,685	938	7,764	6,169
Pipes & fit'gs.	25,282	14,932	161,167	129,055
R. R. spikes	1,579	600	20,140	4,816
Bolts, nuts, rivets and washers ..	2,566	2,604	21,923	15,586
Horseshoes	837	671	7,042	13,972
Cast radiators	226	327	1,859	1,653
Total	643,762	382,113	4,365,019	2,466,107

IRON AND STEEL IMPORTS, GROSS TONS.

	Sept., 1916.	Sept., 1915.	Nine months end. Sept., 1916.	Nine months end. Sept., 1915.
Scrap	6,340	9,229	47,772	29,918
Pig iron	15,731	5,415	97,796	60,891
Ingots, bl'ms and billets of steel.	1,219	854	19,771	9,271
Wire rods	295	614	3,283	3,870
Rails	862	6,273	24,438	60,646
Bar iron	953	813	6,745	6,595
Structural	13	49	1,081	1,202
Sh'ts and plates.	95	66	1,311	924
Tin and terne plate	51	31	826	2,220
Total	25,559	23,344	203,023	175,537

IRON ORE IMPORTS, GROSS TONS.

	Sept., 1916.	Sept., 1915.	Nine months ending Sept., 1916.	Nine months ending Sept., 1915.
Spain	7,172	.....	125,007	32,946
Sweden ...	13,790	6,925	166,536	154,619
Canada	12,275	32,068	130,624	48,235
Newf'ndland and Labrador ..	.....	.....	.....	.....
Cuba	70,750	109,110	529,841	610,698
Other countries..	5,760	25,150	77,595	124,600
Total ...	109,747	173,253	1,029,603	971,098
Manganese ore	73,536	28,989	469,222	173,992
Grand total.	183,283	202,242	1,498,825	1,145,090

IMPORTS AND EXPORTS.

1915.	Imports, gross tons.	Exports, gross tons.
July	20,858	378,890
August	27,556	405,850
September	23,345	381,914
October	34,730	351,039
November	37,131	362,764
December	35,456	353,836
1916.		
January	15,824	354,416
February	20,279	368,869
March	26,212	438,054
April	20,176	384,917
May	32,114	540,580
June	26,786	526,759
July	14,729	503,187
August	32,257	597,739
September	25,559	643,762

No Steel for Private Buildings

The British ministry of munitions, for months past, has been adding new obstacles in the way of the private use of steel, and has now issued a new order placing restrictions upon private buildings, the reason assigned being the scarcity of labor and the fact that "the use of constructional steel in private building work limits the available supply of a material which is essential for the prosecution of the war". It is explained that "the continued demand for labor for the construction of munition factories and other buildings of urgent national importance and the enormous demand for steel for the purposes of the war have compelled the ministry of munitions, in the national interest, to place restrictions upon private demands.

The Imperial Munitions Board, at Ottawa, states that manufacturing firms now at work on munitions will be kept busy until the end of June next on the basis of orders at present in hand.

The Petroleum Iron Works Co., Sharon, Pa., has awarded contracts for the erection of an addition, 120 x 150 feet, to the Fort Pitt Bridge Works, Pittsburgh. The company is operating its plant at maximum capacity.

Schwab Dined

And Tells of Bethlehem Plans for Improvements

Business men of Baltimore entertained Charles M. Schwab, Eugene G. Grace and other officials of the Bethlehem Steel Corporation at an elaborate testimonial dinner Tuesday evening. More than 300 guests attended, including Mabel Garrison, of the Metropolitan Opera company, who sang, and Mayor Preston who, in behalf of the city, presented a gold humidor to Mr. Schwab. In acknowledging the testimonial, Mr. Schwab said the construction program of the Bethlehem Steel Co. will involve the expenditure of $100,000,000 and will include developments at Bethlehem, Baltimore, Harrisburg and elsewhere. Referring to the new enterprise at Sparrows Point, he said the plans contemplate the ultimate employment there of from 15,000 to 20,000 men, with an annual payroll in Baltimore of some $20,000,000. Continuing, he said:

"Our program calls for an expenditure here of about $50,000,000. We have an annual capacity here of about 1,250,000 tons of steel, and we will pay out in freight rates to transportation companies entering Baltimore some $20,000,000 a year. Our work at Baltimore will be building of ships and producing heavier grades of steel products. In the shipbuilding facilities there will be included a new dry dock, as large as any on the Atlantic coast and adequate to accommodate the largest dreadnought.

"This country cannot stand still. The United States produced only 1,000,000 tons of steel in 1880, while this year 40,000,000 tons will be produced. My own belief is that we are just as far from the zenith today as we were when the United States Steel Corporation was formed in 1901. When the war is over there will be a reduction in the demand for ammunition steel, and there will be some recessions in steel prices generally, but the domestic demands for rails, building and other purposes only await a more normal condition of trade to press forward for prompt satisfaction. A period of depression will come, and it will be severe, but it will not be acute, in my judgment, until from three to five years after the war is ended."

The new drop forging plant of the John Obenberger Forge Co., West Allis, Wis., which was recently placed in operation, is now working day and night.

Iron Ore Prices Advance Sharply

Marked Up Dollar and Half—Reservations of Many Million Tons Converted Into Contracts—History of Prices for the Past 28 Years

THE buying of lake iron ore for delivery in 1917 was started late Wednesday afternoon, Nov. 22, when W. P. Snyder & Co., Pittsburgh, sold 185,000 tons of Mesabi non-bessemer at $5.05 per ton. Representatives of sales companies lost no time in getting in touch with buyers and reservations for immense tonnages were quickly converted into sales contracts. After the fixing of the ore carrying charge at $1 per ton from the head of the lakes, an advance of 50 cents over the 1916 rate, sentiment favored an advance of at least $1.25 in the price of ore and leading sellers finally concluded an advance to $1.50. The new prices on bessemer ores are the highest since the opening of that great range, and old range bessemer is higher than at any time since 1887, when the price was $6. Old range non-bessemer ore is higher than at any time since 1890, when the price was 5 cents higher than the 1917 quotation.

The buying season for 1917 is one of the earliest on record, but two other seasons started a few days earlier, that for 1907, the earliest on record, having started Nov. 2, 1906, while the buying for delivery in 1913 started Nov. 19, 1912. Other early buying movements were Dec. 5, 1905, for 1906, and Dec. 15, 1889, and Dec. 15, 1899, as the dates for the following years, 1890 and 1900. Each of five years in the past 28 had two buying movements, namely, 1899, 1905, 1909, 1912 and 1915.

The year 1909 stands out in the history of the ore trade on account of the refusal of buyers to accept the prices named in February of that year. Although the panic of October, 1907 had shaken the business of the country to its very foundations, and in spite of strong opposition from many Cleveland ore sellers, the 1907 ore prices were reaffirmed for 1908. Furnaces refused to buy and on June 15, 1908, prices were reduced 50 cents. The buying movement then started was the latest on record. In 1909, many reservations were made during the early months, but prices were not determined until May 10, 1909. In 1910, all the bessemer ore available was reserved before prices were established and reservations were quickly turned into actual sales after prices were announced. In 1911, sales were started at a reduction of 50 cents from the price of 1910. Very reluctantly, in 1914, the ore sellers came to the conclusion that it would be necessary to sell at the very low prices of 1912 and the buying was started May 1, but there was very little activity in the market and buying dragged throughout the year. Conditions prevailing in the spring of 1915 were similar to those of the spring of 1914, and the 1914 prices were reaffirmed on April 19, 1915. The buying was very slow at the start, but all the ore that could be shipped was sold before the close of the season, when improvement in the iron business brought increased demand for ore and some furnaces were unable to cover for their requirements.

The buying movement for 1916 delivery was started Dec. 7, 1915, at an advance of 70 cents over the 1915 prices and no trouble was experienced in disposing of the record-breaking tonnage shipped during the year. In fact, during the past few months, sales of about 100,000 tons have been made at advances over the regular season rate, the advance generally being $1.

The accompanying chart, Fig. 1, shows the prices at which iron ore has sold during the 28 years beginning Dec. 15, 1889, together with the pre-

Table I.

SELLING PRICE OF IRON ORE AND PRICE OF PIG IRON AT DATE OF BUYING MOVEMENT 1890-1917.

Season.	Date buying movement.	—Season Iron Ore Prices— Old range Bessemer.	Mesabi Bes'm'r.	Old range non-Bes'm'r.	Mesabi non-Bessemer.	—Iron Prices— Valley Bes'm'r.	Foundry Iron No. 2.
1890	Dec. 15, 1889	$5.50	no sale	$5.25	no sale	$22.15	$18.15
1891	June 1, 1891	4.50	no sale	4.25	no sale	15.15	15.00
1892	Jan. 31, 1892	4.50	no sale	3.65	no sale	15.00	13.65
1893	Mar. 15, 1893	3.85	$3.00	3.20	no sale	12.65	12.15
1894	Mar. 1, 1894	2.75	2.35	2.50	no sale	9.65	9.65
1895	April 1, 1895	2.90	2.19	2.25	$1.95	9.40	9.40
1896	May 1, 1896	4.00	3.50	2.70	2.25	12.40	11.15
1897	May 20, 1897	2.60	2.25	2.15	1.90	8.35	8.40
1898	Mar. 20, 1898	2.75	2.25	1.85	1.75	9.55	9.80
1899	Feb. 1, 1899	3.00	2.40	2.15	2.00	10.30	9.75
1900	Dec. 15, 1899	5.50	4.50	4.25	4.00	24.15	22.15
1901	Apr. 15, 1901	4.25	3.25	3.00	2.75	16.15	14.40
1902	Feb. 1, 1902	4.25	3.25	3.25	2.75	15.90	15.90
1903	Mar. 20, 1903	4.50	4.00	3.60	3.20	21.50	21.65
1904	Apr. 15, 1904	3.25	3.00	2.75	2.50	13.35	13.15
1905	Feb. 1, 1905	3.75	3.50	3.20	3.00	15.50	16.00
1906	Dec. 5, 1905	4.25	4.00	3.70	3.50	17.25	17.25
1907	Nov. 5, 1906	5.00	4.75	4.20	4.00	21.50	21.50
1908	June 15, 1908	4.50	4.25	3.70	3.50	16.00	15.00
1909	May 10, 1909	4.50	4.25	3.70	3.50	14.75	14.25
1910	Dec. 24, 1909	5.00	4.75	4.20	4.00	19.00	17.25
1911	Apr. 21, 1911	4.50	4.25	3.70	3.50	15.00	13.75
1912	Mar. 20, 1912	3.75	3.50	3.00	2.85	14.25	13.25
1913	Nov. 19, 1912	4.40	4.15	3.60	3.40	17.25	17.50
1914	May 1, 1914	3.75	3.50	3.00	2.85	14.00	13.25
1915	Apr. 19, 1915	3.75	3.45	3.00	2.80	13.60	12.75
1916	Dec. 7, 1915	4.45	4.20	3.70	3.55	18.50	18.80
1917	Nov. 22, 1916	5.95	5.70	5.20	5.05	30.00	26.00

Table II.

TABLE SHOWING PERCENTAGES OF ADVANCES AND DECLINES IN ORE AND PIG IRON, 1903-1917.

Year.	Old range bessemer.	Advance or decline in price.	Advance or decline in per cent.	Bessemer pig iron Valley.	Advance or decline in price.	Advance or decline in per cent.
1917	$5.95	+$1.50	+33.7	$30.00	+$11.50	+62.2
1916	4.45	+ .70	+18.7	18.50	+ 4.90	+36.0
1915	3.75	.....	.....	13.60	— .40	— 2.9
1914	3.75	— .65	—14.8	14.00	— 3.25	—18.8
1913	4.40	+ .65	+17.3	17.25	+ 3.00	+21.1
1912	3.75	— .75	—16.7	14.25	— .75	— 5.0
1911	4.50	— .50	—10.0	15.00	— 4.00	—21.1
1910	5.00	+ .50	+11.1	19.00	+ 4.25	+28.8
1909	4.50	.....	.....	14.75	— 1.25	— 7.8
1908	4.50	— .50	—10.0	16.00	— 5.50	—25.6
1907	5.00	+ .75	+17.6	21.50	+ 4.25	+24.6
1906	4.25	+ .50	+13.3	17.25	+ 1.75	+11.3
1905	3.75	+ .50	+ 1.54	15.50	+ 2.15	+16.1
1904	3.25	— 1.25	—27.8	13.35	— 8.15	—37.9
1903	4.50	.....	.....	21.50	.....	.....

vailing valley prices of bessemer and No. 2 foundry pig iron at the date at which the ore buying movement was at its height. The idea, which was first embodied in chart form in our issue of Feb. 21, 1907, is to establish in a graphic manner the relation of the raw material price to that of pig iron. During the past years up to 1909, barring some slight irregularities, the two series of lines approached nearly to being parallel, showing that ore prices had declined with the prices of pig iron. This was not true in 1909, when the lines representing pig iron prices had a downward tendency while those for iron ore prices continued straight. In 1910, when ore prices were fixed, the lines for both pig iron and ore had an upward tendency, but later in 1910, pig iron started downward and continued to decline throughout the year, the decline in bessemer being $4.

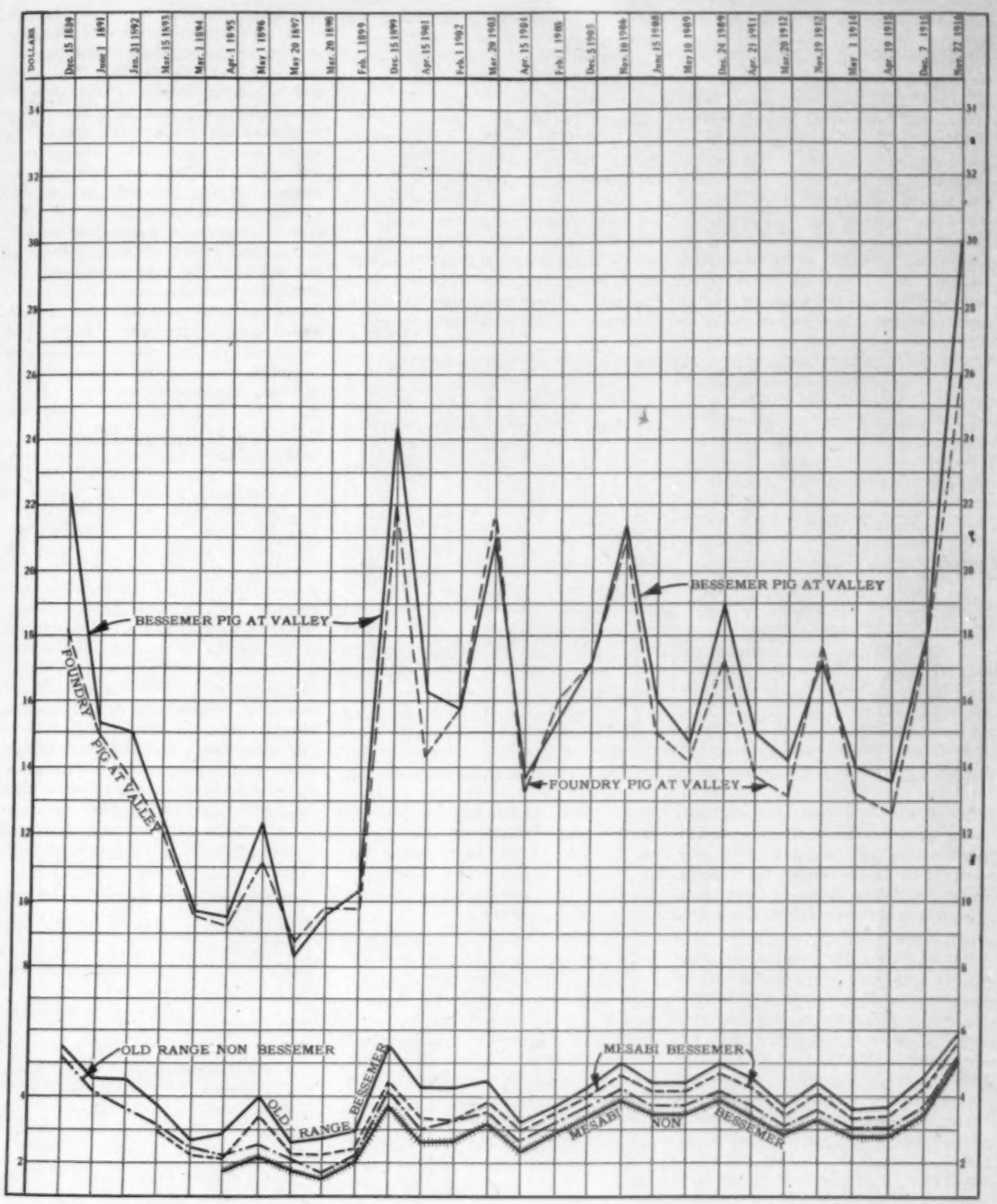


FIG. 1—FLUCTUATIONS OF PRICES OF IRON ORE AND PIG IRON, 1889 TO 1917

At the time of the fixing of ore prices in April, 1911, and March, 1912, the downward tendency was common to both pig iron and iron ore, while at the time of the fixing of prices for 1913, the tendency of both pig iron and iron ore was upward. In May, 1914, lines for pig iron and iron ore were alike in tending downward, but in April, 1915, pig iron prices were lower than they were a year before and lines on the chart turn downward, while the lines showing ore prices are straight. In December, 1915, when ore buying started for 1916 delivery, the lines showing pig iron prices advanced sharply and those showing ore prices also indicated an upward trend, but not as decided as those which represent the prices of pig iron. The latest change in quotations that for 1917 delivery, is indicated by very sharp advances in the lines representing both pig iron and ore.

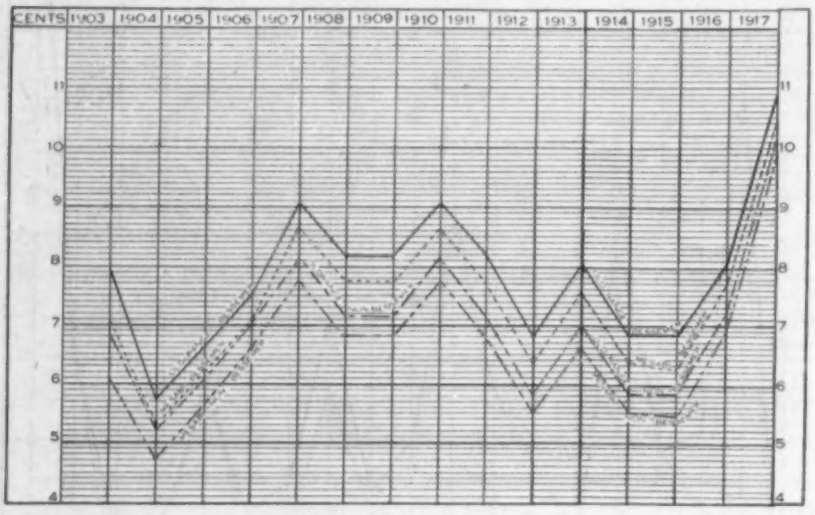


FIG. 2—RANGE OF LAKE SUPERIOR ORE PRICES BY UNITS OF IRON, NATURAL

In Table II are shown the percentages of rise and decline of old range bessemer ore and bessemer pig iron from 1903 to the present time. The advance of 33.7 per cent in the price of ore compares with an advance of 62.2 per cent in the price of bessemer pig iron. The gain in both pig iron and ore shown in last year's table was the largest of any year up to that time, being 20 per cent on ore and 36 per cent on pig iron. In 1915, old range bessemer ore prices remained unchanged, while pig iron prices declined 2.9 per cent. In 1914, ore prices declined 14.8 per cent from the 1913 prices and pig iron fell off 18.8 per cent. In 1913, the advance in ore was 17.3 per cent, and in pig iron, 21.1 per cent.

The fluctuations of the four grades of Lake Superior ore, according to the value of units of iron in the natural state, is shown in Fig. 2. For the years preceding 1907, the guarantee of bessemer ores was 55.70 per cent natural and for the non-bessemer ores it was 52.80 per cent, except Mesabi non-bessemer for 1905 and 1906, when the natural iron content was 53 per cent. Before sales for delivery in 1907 were made, the natural iron content for the base was changed to 55 per cent for bessemer and 51.50 per cent for non-bessemer. The fluctuations in unit prices are shown in the table below.

Years of declining prices have been as follows: Old range bessemer, 1891, $1; 1893, $0.65; 1894, $1.15; 1897, $1.40; 1901, $1.25; 1904, $1.25; 1908, $0.50; 1911, $0.50; 1912, $0.75; 1914, $0.65. Years of advancing prices have been as follows: Old range bessemer, 1895, $0.15; 1896, $1.10; 1898, $0.15; 1899, $0.25; 1900, $2.50; 1903, $0.25; 1905, $0.50; 1906, $0.50; 1907, $0.75; 1910, $0.50; 1913, $0.65; 1916, $0.70; 1917, $1.50. In 1892, 1902, 1909 and 1915 there were no changes in prices.

VALUE OF UNIT OF IRON FOR 15 YEARS.

	Old range.		Mesabi.	
	Bessemer, cents.	Non-bessemer, cents.	Bessemer, cents.	Non-bessemer, cents.
1917	10.81	10.10	10.36	9.81
1916	8.09	7.18	7.64	6.89
1915	6.82	5.83	6.27	5.44
1914	6.82	5.83	6.36	5.53
1913	8.00	6.99	7.55	6.60
1912	6.82	5.83	6.36	5.53
1911	8.18	7.18	7.73	6.80
1910	9.09	8.16	8.64	7.77
1909	8.18	7.18	7.73	6.80
1908	8.18	7.18	7.73	6.80
1907	9.09	8.16	8.64	7.77
1906	7.50	7.01	7.05	6.60
1905	6.61	6.06	6.17	5.66
1904	5.73	5.21	5.29	4.73
1903	7.94	6.82	7.05	6.06

Fluctuations of iron ore prices expressed in values of units of iron in natural state.

Will Build Canal

Toronto, Nov. 28.—The Ontario hydro-electric commission has decided to undertake forthwith the construction of the projected canal between Chippewa creek and Queenston, in the Niagara district, for the supply of 200,000 horsepower of electrical energy. The work will be carried on under the direct control of the commission, as it was found that contractors were not willing to render except on the basis of a probable advance in the cost of fuel and an estimate of 25 per cent on cost as profits. In order to save fuel and labor cost, electric-driven excavating machinery will be provided, which will be of the heaviest type and cost upwards of $800,000. The canal will be 12 miles in length and the estimated cost of the entire work is $9,000,000. When it is completed, the commission will be able to supply power at the reduced rate of $7.50 per horsepower.

To Enlarge Plant

Contracts have been let for the first of a group of buildings to be erected by the Cleveland Galvanizing Works Co., Cleveland. These buildings will be located on a site opposite the company's present plant on Cooper avenue. It is expected that the first building, which will be a 1-story, 60 x 335-foot structure, of brick and steel, will be completed by the first of April. It will be served by a siding from the Pennsylvania railroad, and will contain chutes and pockets for the reception and distribution of raw materials. This building will be used exclusively for galvanizing, as this department at the present time is badly cramped. The company manufactures weldless wire chain and chain products.

Lets Contract for Building

The Braddock Mfg. Co., Braddock, Pa., has let the contract for building an addition to its present open-hearth plant to the McClintic-Marshall Construction Co. All other additions including the new furnaces are being constructed by the company's own forces. All work now under construction is being rushed for completion by Dec. 15, so that all new departments will be under full double turn operation by Jan. 1, 1917.

The Vitreous Enameling Co., Cleveland, is building a new factory on Harvard avenue, south of the city. The building is 138 x 180 feet. The walls will be of brick with a wooden roof supported on steel-truss frame. The cost is $40,000. The Austin company has the complete contract.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

THE appointment of R. F. Randolph, recently with Bethlehem Steel Co. as superintendent of steel plant of the Dominion Steel Corporation, has been followed by other changes in the staff. W. H. Bishop, also formerly with the Bethlehem company, has been appointed assistant general superintendent and given charge of the coke ovens, blast furnaces and open hearth department, and H. E. Rice has been promoted to be assistant general superintendent in charge of the mills. George D. Macdougall, mechanical superintendent of the steel works, becomes chief engineer.

John C. Neff has been elected to the executive committee of the Crucible Steel Co. of America. The other members have been re-elected.

Claude A. Witter, general manager of the Southwark Foundry & Machine Co., Philadelphia, left on Nov. 11 for a trip to England and France.

H. S. Kiehl has resigned as a director of the Jones & Laughlin Steel Co., Pittsburgh, with which he was identified for 21 years. Mr. Kiehl plans to spend the winter in the south.

Robert McMillan, of the Pittsburgh Steel Co., Pittsburgh, was elected president of the Purchasing Agents' Association of Pittsburgh, Nov. 21, at a meeting at the Fort Pitt hotel.

C. R. Youmans, formerly assistant superintendent of the Peerless Automobile Co., Cleveland, has resigned his position to become general manager of the Youmans Machine Co., that city.

C. B. Cornell, formerly of the Timken Roller Bearing Co., Canton, O., recently has taken charge of the sales of the Basic Mineral Co., Pittsburgh, manufacturer of fluxes.

Frederick R. Pettit, general purchasing agent of the J. I. Case Threshing Machine Co., Racine, Wis., has resigned, effective Jan. 1, to accept the position of vice president of the J. I. Case Plow Works, also of Racine.

According to a dispatch from Paris, Gustav Adolph Trube, general manager of the French Westinghouse Air Brake Co., who was deported from France last January, will be allowed to return to that country after the war, if he desires.

Louis Simmel, formerly of the Hurlburt Motor Truck Co., New York, and now associated with John MacGregor Grant, Inc., forwarding agent and underwriter, 120 Broadway, New York, left on the CHRISTIANAFJORD, Nov. 18, for a trip to Europe.

Geo. S. Young, Bridgeport, Conn., is establishing a new plant which will be devoted to the manufacture of casting copper, brass ingots, brass billets and aluminum ingots. The new plant is expected to be operating in a few weeks.

E. E. Russell has been appointed general purchasing agent of the J. I. Case Threshing Machine Co., Racine, Wis. Mr. Russell has been with the Case company since 1889. For the past 12 years, he has been in charge of foreign sales.

S. C. Yates, purchasing agent of the Cambria Steel Co., has been made purchasing agent of the Midvale Steel Co., Worth Bros. Co. and the Wilmington Steel Co., vice H. L. Murphey, resigned, effective Nov. 21. Mr. Yates' headquarters are in the Widener building, Philadelphia.

Stanley P. Rockwell has resigned his place as head of the hardening and annealing departments of the New Departure Mfg. Co., Bristol, Conn., to take a responsible position on the metallurgical sales force of the E. F. Houghton Co., Philadelphia. He is a son of Albert F. Rockwell, president of the Marlin Arms Co. and the Bristol Brass Co.

Dr. John A. Brashear, Pittsburgh scientist and former president of the American Society of Mechanical Engineers, was the guest at an informal reception in the foyer of the Frick building, Pittsburgh, Nov. 22, his seventy-sixth birth anniversary. Several thousand people attended the reception. Dr. Brashear left Pittsburgh Nov. 24 for a trip to the far east.

W. J. Golden has been appointed general manager of sales for the Ferguson Steel & Iron Co., Buffalo. For the past four years Mr. Golden has been manager of the jobbing department for the Lackawanna Bridge Co. Prior to his engagement with the Lackawanna company, he was in the employment of the Railway Steel Spring Co. for seven years as manager of the Philadelphia plant.

Wm. Ellis Corey, chairman of the Midvale Steel & Ordnance Co., has been erected a director of the Baldwin Locomotive Works. Other new directors are Sidney F. Hutchinson and S. F. Tyler, of Philadelphia, who, with Mr. Corey, have been chosen to fill the vacancies caused by the retirement of Edw. T. Stotesbury and T. De Witt Cuyler, of Philadelphia, and John G. Shedd of Chicago.

The Society of Automobile Engineers will hold its annual winter meeting, Jan. 11, 1917, at the association's headquarters, 29 West Thirty-ninth street, New York. The technical papers to be presented at the one day session include discussions relating to aeroplane, tractor and marine engines in addition to those devoted to automobile engineering. An interesting feature which is planned for the meeting includes a paper by Capt. V. E. Clark, U. S. A., which deals with the experiences of army aviators on the Mexican border.

Leo C. Steinle has been appointed direct representative in France for the Modern Tool Co., Erie, Pa., manufacturer of grinding machines and threading tools, with offices at Paris and Lyons. Mr. Steinle will also look after the interests of the Steinle Turret Machine Co., Madison, Wis., with which company he is directly connected. R. H. Wood has been appointed manager of the Chicago district office of the Modern Tool Co., with offices at 32 North Clinton street. Mr. Wood was connected for a number of years with the Buffalo office of the Warner & Swasey Co.

An announcement has been made that the machine shop of the F. A. Maxwell Co., located at 1011 Power avenue, Cleveland, has changed hands and will henceforth be known as the Youmans Machine Co. W. H. Staring, secretary and general manager of the Peerless Automobile Co., is president, and C. H. Youmans, formerly assistant superintendent of the same plant, general manager of the new concern. The company has incorporated for $50,000. Automobile parts and tool jigs and fixtures will be manufactured. As the new concern is manufacturing on a larger scale than the former owners, some new equipment has been purchased, to provide for this expansion.

Iron and Money: Fact and Comment

Commodities, Wages and Stocks Rising—Peace Rumors Again Current —Submarine Activity on This Side of Atlantic Again Feared in Wall Street

WAGE advances recently announced by the United States Steel Corporation and leading independent steel producers are symtomatic of existing conditions. The cost of living has been making rapid strides upward, for commodity prices are advancing faster than ever before in the world's history. The profits in the steel trade have been huge, but employers have demonstrated their willingness to play fair with their workmen. The Corporation has increased wages by 33 1/3 per cent the past year, while most independents have shared their profits to a similar extent. A noticeable circumstance connected with the latest advance is the absence of any strings to the increase. Some companies, when they announced advances in wages last spring, did so "for the period of the war". But now no such provision is made. Every thinking man knows that a day of reckoning must come some time, that sooner or later wages will have to come down. But for the present the country is thinking more of making hay than of after war readjustment.

Even Wall street, with its propensity for seeking trouble beyond the horizon, has submerged its caution in a speculative debauch. Such is the effect of the remarkable, almost fabulous industrial profits. Yet, every now and then, we are given a presentiment of what will take place when active peace negotiations are undertaken. One day this week, for example, wheat was smashed down 10 cents a bushel in the Chicago pit, because of an imagined impending armistice in Europe. Fear of an export embargo on foodstuffs may have had something to do with this decline.

General conditions affecting trade and industry have changed little in recent weeks. The death of the Austrian emperor did not cause even a ripple. The stock market has been vaguely uneasy over reports that German submarines were again on this side of the Atlantic, especially as certain bankers last week warned that an outbreak of new submarine warfare might bring the long threatened breaking off of diplomatic relations between the United States and Germany.

Steel stocks for the most part scored broad advances last week, although a few registered declines. Quotations on a number of leading iron, steel and industrial stocks at the close of the New York stock exchange, Nov. 25, and net changes for the preceding week follow:

	Close Nov. 25.	Net chg.
American Can	64	— ⅛
American Can, prfd.	113½	— ½
Amer. Car & Fdy.	75½	+3⅛
Amer. Car & Fdy., prfd.	117⅜	+ ⅜
American Locomotive	92¼	—1⅜
American Locomotive, prfd.	108	.....
American Steel Foundries	69	+ ⅛
Baldwin Locomotive	84½	—2
Baldwin Locomotive, prfd.	107⅜	+ ⅜
Bethlehem Steel	650	—50
Bethlehem Steel, prfd.	155	—13
Colorado Fuel & Iron	59	— ⅛
Continental Can	100½	—2½
Crucible Steel	88¾	—2¾
Crucible Steel, prfd.	122½	—1
General Electric	181	—1
Gulf States Steel	180	+20
Gulf States Steel, 1st prfd.	115	+9¼
Gulf States Steel, 2d prfd.	180	+15
Inter. Harv. of N. J.	124¾	+7
International Harv. Corp.	85⅛	+5
Lackawanna Steel	105¼	+1
Nat'l Enamel'g & Stmp. Co.	34½	+ ¼
Nat'l En. & Stmp. Co., prf.	99⅜	— ⅜
Pressed Steel Car	85⅛	—1⅞
Pressed Steel Car, prfd.	107½	+2
Pullman Palace Car	166⅛	—1⅜
Republic Iron & Steel	91⅛	+ ⅜
Republic Iron & Steel, prfd.	115	—1¾
U. S. C. I. P. & Fdy. Co.	26½	— ⅛
U. S. C. I. P. & F. Co., pr.	65⅞	—1½
United States Steel	129	+2¾
United States Steel, prfd.	121¼	— ½
Westingh'se Mfg. Co.	64⅞	— ¾

Maximum quotations for a number of leading iron and steel securities not listed on the New York stock exchange as of Nov. 24 and Nov. 17, follow:

	Nov. 24.	Nov. 17.
American Radiator	425	...
American Ship Building	70	67½
Cambria Steel	130	135
Chicago Pneumatic Tool	73	73½
LaBelle Iron Works	94½	84
Lake Superior Corp'n	29¾	29⅜
Stewart-Warner Speed. Co.	109	109
Warwick Iron & Steel	9¾	10
Westinghouse Air Brake	162	155
Westingh'se Elec. & Mfg. Co.	65¾	66⅛

Berger Mfg. Co.

The Berger Mfg. Co., Canton, announces that it will increase its capital from $5,000,000 to $10,000,000, and practically double its output. The present capital consists of $2,500,000 7 per cent preferred stock and $2,500,000 common. It is believed the new issue will be half preferred and half common. A short time ago it was thought that the Berger company would build a steel plant, because it had been deprived of a supply when the United Alloy Steel Corporation took over the United Steel Co. This plan now is said to have been dropped. Canton press reports say the United Alloy has tentatively agreed to furnish the Berger company 10,000 tons of steel a month from the new bar mill at plant "B".

The company was established in 1889 with $25,000 capital. With the completion of extensions now planned it will employ 5,000 men. In the announcement sent out by directors, the company says:

"The company already has in course of erection extensive additions to its plant and the constantly growing business of the company renders it necessary to increase the capital stock for the purpose of affording capital to properly handle the business offered.

"The proceeds arising from the increased capital, if authorized, will be used in further enlargements of the business of the company and possibly in the development of new lines of product of a nature similar to that in which we are now engaged. Definite plans for further extensions have not yet been filed, but they necessarily will result in a considerable increase of the number of men that can find steady employment at our plant."

Directors are: Edward A. Langenbach, Fred H. Snyder, Harry R. Jones, Richard Y. Yancey, Wm. S. Langenbach, Alfred E. Hockwalt and Charles W. Krieg.

Financial Crop Ends

The New York Air Brake Co. yesterday declared an extra dividend of 12½ per cent, payable in five quarterly dividends of 2½ per cent each for the next five quarters. The dividends were declared out of large surplus net earnings chiefly derived from war contracts.

* * *

The Steel Co. of Canada, Ltd., Hamilton, Ont., will pay a dividend of 4 per cent on its $11,500,000 common stock. This is the first dividend declared by any Canadian steel company on its common stock since the war began. The company's gross business for the nine months is placed at $29,000,000.

* * *

The Steelwhite Co., recently incorporated with a capital stock of $200,000, has purchased a site in Jamestown, N. Y., adjoining the plant of the Interior Metal Mfg. Co., and plans to erect a 4-story building, 100 x 163 feet. The company will manufacture metal kitchen cabinets, metal tables and metal hospital equipment. The company has patents on designs and processes formulated by Otho M. Otte, operating head of the new company, who also is treasurer and general manager of the Interior Metal

Mfg. Co. James Lippincott and Julian Burdick, president and treasurer, respectively, of the West Penn Steel Co.; James W. Arrott Jr., a director in the Standard Sanitary Mfg. Co., and Norwood Johnson, president of the Carnegie Natural Gas Co., are among those interested in the new enterprise.

* * *

Charles W. Morse, president of the United States Ship Building Co., announces his company has bought 30 acres on the east bank of the Thames river near New London, Conn., for a site for a ship yard. He said the yard would be completed in about two years and would employ 4,000 to 5,000 men. The company already owns a yard at Noank, Conn., employing 500 men.

* * *

The Braddock Machine & Mfg. Co. has been reorganized and now is known as the Braddock Mfg. Co., Braddock, Pa. The company has been incorporated with a capital stock of $300,000 by William E. Troutman, Robert W. Tener and James L. Adams. Mr. Tener and Mr. Troutman formerly were identified with the United Engineering & Foundry Co., Pittsburgh. The company plans to install the second 20-ton open hearth furnace at an early date.

* * *

Control of the Atlantic Steel Co., Atlanta, Ga., has passed from the hands of New York interests to a syndicate of Atlanta men organized by T. K. Glenn, president of the company. The syndicate bought 2,400 shares of the stock for $300,000. A year ago the company was reorganized and since that time control has rested in New York. This stock was quoted at $50 a share when the company was reorganized. The syndicate paid $125 a share.

* * *

Holders of second preferred stock of the Gulf States Steel Co., Birmingham, Ala., are rejoicing over the news that the second preferred will be converted into common by Dec. 15, which will enable them to share in the 2 per cent quarterly dividend on the common. The capitalization of the company will be altered by this conversion to $2,000,000 preferred and $9,000,000 common. Estimates of $33,000,000 have been placed on the company's iron ore lands, equal to three times the par value of the company's capital.

* * *

The Bilyeau syndicate, prospective purchaser of the Thomas Iron Co., already has deposited in the Central Trust Co., New York, $850,000 of the $3,500,000 for which it is proposed the plant will be sold. A conference of the stockholders' committee and the syndicate will be held at Easton, Pa., shortly, when the sale may be consummated, provided everything is satisfactory to stockholders. The sale of the Thomas Iron Co. carries with it all its holdings. For five years the plant has paid no dividends and it is this fact that led to the proposition to sell the plant advanced by the stockholders.

* * *

Approximately $18,000,000 of the $18,695,000 convertible sinking fund 5 per cent gold bonds of the July 28, 1915, issue of the Westinghouse Electric & Mfg. Co. have been converted into common stock on the basis of 20 shares for each bond of $1,000, face value. The privilege of conversion expires on the last day of the calendar year. The bonds which are not converted by Jan. 1 will be taken over by the company at 105 and accrued interest, or at about $1,075 for each $1,000 face value, whereas if each bond is converted into 20 shares of the common stock, the holder realizes in the neighborhood of $1,300.

* * *

The Antrim Iron Co., Grand Rapids, Mich., is calling in $150,000 bonds for redemption Dec. 1. The Michigan Trust Co. announces that the first issue of 1913 bonds, also part of the 1914 issues, will be paid at this time. The company was organized in 1886 and has one blast furnace manufacturing car wheel and malleable charcoal pig iron, with a capacity of 30,000 tons a year. The stack was last rebuilt in 1912. The company's annual report states that it has experienced unprecedented business this past year. Officers follow: President, W. Barnhart; vice president and treasurer, J. C. Holt; secretary, H. J. Bennett.

Ingot Molds

Will Be Made at Plant of Penn Mold & Mfg. Co.

The Penn Mold & Mfg. Co., Wheeling, W. Va., has awarded contracts to the Austin Co., Cleveland, for the erection of a plant at Dover, O., for the manufacture of ingot molds. The company has closed a contract with the Penn Iron & Coal Co., owner of the blast furnace at Canal Dover, for bessemer and pig iron requirements. Equipment will be installed for the use of both direct and cold metal, although more than 50 per cent of the iron will be used direct from the blast furnace. The Whiting Foundry & Equipment Co., Hubbard, Ind., will install a 102-inch cupola for melting iron and contracts have been awarded for auxiliary foundry equipment. The Morgan Engineering Co., Alliance, O., will furnish a 25-ton electric crane and the Case Crane & Engineering Co., Columbus, O., will install a 15-ton crane.

The plant, which will be put into operation in January, will have a capacity of 400 tons a day. Officers of the company are: President, C. E. Blue; vice president, H. S. Bradley; treasurer, H. S. Sands, and general manager, W. V. Holt.

A request comes from F. L. Roberts, foreign trade secretary of the chamber of commerce, Cleveland, who asks for catalogs, circulars and other advertising literature printed in foreign languages for distribution abroad.

Will Make Trucks

At New Plant of Pull More Truck Co., New Castle, Pa.

A number of men connected with the iron and steel industry in western Pennsylvania are connected with the Pull More Truck Co., which, as recently stated in these columns, has completed plans for a new plant at New Castle, Pa. The company will manufacture a 3-ton truck.

Edward M. S. Young, vice president of the Standard Gage Steel Co., Beaver Falls, Pa., is president of the new company; Col. H. P. Bope, vice president and general manager of sales of the Carnegie Steel Co., is vice president, and John M. Richards, formerly connected with the Standard Gage Steel Co., is general manager of the New Castle concern. Among others interested are: B. G. Follansbee, president of Follansbee Bros. Co., Pittsburgh; D. M. Clemson, a director of the Carnegie Steel Co.; J. W. Kinnear, a director of the Firth-Sterling Steel Co., Pittsburgh; George Greer, chairman of the La Belle Iron Works, Steubenville, O., and A. C. Schiller.

The Austin Co., Cleveland, has been awarded a contract for the erection of the first unit, 500 x 100 feet, of a unit system plant. Pittsburgh offices of the company are in the Frick Annex building.

New Type of By-Product Ovens

A contract for the erection of 60 Wilputte by-product coke ovens at the plant of the Woodward Iron Co., Woodward, Ala., has been placed with the Otto Coking Co., Inc., 6 Church street, New York. The ovens, which will be of a new type embodying important improvements, will have a capacity of 13 net tons of coal and will operate on 18-hour coking time. The new plant is expected to be in operation about July, 1917. The shipment of the material for the new battery of Wilputte ovens to be erected by the Mitsubishi Goshi Kaisha at Kenjiho, Korea, is being completed by the Otto company. The new ovens will furnish the coke for the blast furnace plant now being erected for the Mitsubishi company at Kenjiho.

The Riter-Conley Mfg. Co., Pittsburgh, is building two 250-ton blast furnaces for the Han-Yeh-Ping Iron & Steel Co., Ltd., of Hanyang, China. The Han-Yeh-Ping Iron & Steel Co. has started the erection of a new steel plant about 20 miles from its iron ore mines. The site consists of about 670 acres.

Business News of Nation's Capital

Higher Cost of Labor and Many Products Will Increase Expenditures in Carrying Out the Extensive Building Plan of the Navy

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, Nov. 28, 1916.

THE effect on the navy department of the increased costs of labor, steel and other products used in connection with ship construction were recited to the house committee on naval affairs last week at its hearings on the department's tentative draft of the naval bill for 1918. The committee proposes to lay the bill before the house as quickly as possible after congress convenes. The second session of the sixty-fourth congress begins next Monday, and it is expected to close the hearings this week.

As now drawn, the bill carries appropriations aggregating $379,151,701, or about $70,000,000 more than was appropriated for the current fiscal year. The building program provides for three battleships, one battle cruiser, three scout cruisers, 16 torpedo boat destroyers, one submarine tender, one destroyer tender and four fleet and 14 coast defense submarines. It has been roughly estimated that these vessels will require approximately 135,000 tons of shapes and plates.

Rear Admiral Frederic R. Harris, chief of the bureau of yards and docks, told the committee that increasing prices of labor and material were rendering the large navy building program on which congress has embarked doubly expensive. Passing on an estimate of $2,000,000 for shore station maintenance as against $1,800,000 last year, he said the actual sum needed would be nearer $3,000,000 and that it would buy no more than $1,800,000 did one year ago. Shapes and plates, he said, had gone up from $55 to $102 per ton, while the latest quotations on locomotive cranes ran as high as $24,000 for machines that cost $10,000 last year.

Rear Admiral Robert S. Griffin, chief of bureau of steam engineering, said that formerly boiler plates could be had for 8c a pound, while now they are 12.4c a pound. Copper, worth normally 14c a pound, was said to be selling for 33½c a pound. Admiral Griffin also made the interesting statement that the additional 15 days' leave of absence given workmen in navy yards has increased the outlay for labor 5 per cent. In this bureau alone, this item runs up to $250,000 or $300,000 a year in increased expense.

More Space Needed

Discussing conditions as to available space at navy yards, Admiral Harris said there is no place at the important naval establishment at Norfolk, Va., where the fleet which has been ordered built may assemble all at once. There is room for four of the new ships only. The navy now plans to increase the water space there, so that all 32 of the dreadnaughts of the new navy may ride there freely. Secretary Daniels has decided to make use of $6,000,000 appropriated by congress to enlarge the Norfolk and Philadelphia yards for capital ship construction and also to prepare the Boston, Portsmouth, N. H., Charleston S. C., and Bremerton yards for building of smaller units. According to plans, the Norfolk yard is to be one of the greatest naval establishments in the world. The large dry dock, Admiral Harris said, will require 2,400 horsepower more than there is in the yard at present. Other additional accessories are found in the added fuel, which will cost $1,500,000 more than usual and the new construction and repair bills, amounting to another $1,500,000. Estimates also include $73,639,902 for the construction and machinery of hulls and for outfits of vessels heretofore authorized; account of submarines to be built, $16,816,11, and armor and armament, $25,000,000. These are all large increases over the current appropriation. Admiral Harris said that navy designers are planning battleships which will have a length of 700 feet, or 100 feet longer than ships already provided for. Rear Admiral Joseph Strauss, chief of the bureau of ordnance, told of the purpose to arm each of the new ships with 12 16-inch, 50-caliber guns over 65 feet long, supposedly the most powerful weapons in the world. Chairman Lemeul P. Padgett of the committee said that it had not yet been determined whether to recommend a 32,000-ton, 36,000-ton, or 40,000-ton battleship. Until this is done, the estimated cost of the ships cannot be made.

Admiral Griffin pointed out that 21 knots has been adopted as the standard speed for battleships. This was decided upon because it had been found that greater speed required the sacrifice of other qualities of offense or defense. England, which had adopted higher speed, was said to have fallen back upon 21 knots. Admiral Griffin said that oil will be used exclusively as fuel in the new ships, and he thought there would be no return to coal, if the government ownership of California oil lands, which he believes it possesses, is upheld.

Tremendous Horsepower

It was stated that the battle cruisers would be 180,000 horsepower, to be applied in a manner never before seen in the workings of a marine engine. Asked as to progress made in developing a satisfactory aeroplane engine, Admiral Griffin said a good 12-cylinder, 500-horsepower engine was "coming on". He expressed the belief that foreign manufacturers have produced better engines because they used the finest possible materials; and that Americans have only recently awakened to the necessity of using the highest grade of steel and other metals. The admiral explained that American aeroplane and submarine constructors are rapidly developing satisfactory engines, and saw no reason why the performance of European craft of both types could not be equaled. The largest available aeroplane engine in this country now was said to have only 200 horsepower.

Speaking of the battle cruisers for which bids will be opened on Dec. 6, Admiral Griffin said private builders are cautious as to submitting bids because of the great horsepower required, but he asserted the department has no doubt of the results.

Butler Causes Surprise

When Admiral David W. Taylor, chief constructor of the navy, was before the committee telling of the time that ship building companies require for building battleships for the 1917 program, Representative Thomas S. Butler, ranking minority member of the committee, created mild surprise when he said he proposed to ask the United States to build its own ships. Mr. Butler, in his past long service as a member of the house and of the committee on naval affairs, has been rather consistent in opposing

the growth of government activity in the industrial field and made a strong fight against the bill for a government-owned armor plate plant. He said he was impatient, however, because of the long periods the ship building companies are requiring for construction of battleships and that the navy yards had better take up the work because they can deliver a vessel in 30 months, a delivery which, so far, they have not even approached. Mr. Butler said the people of the United States would not "stand for" such delay of delivery as proposed by private yards. Admiral Taylor, however, expressed doubt that the United States can build battleships any faster than private companies. Explaining that labor is scarce at present, the admiral said it does not seem possible for the yards to do any better than they have proposed.

Navy Yard Construction

Secretary Daniels, however, has shown his trust in navy yard construction by awarding the remaining two of the 20 torpedo boat destroyers of the 1917 program to the Mare Island, Cal., navy yard. Its estimate was $968,105 each, deliveries being promised in 18 and 20 months. Mr. Daniels said the award was not given to the William Cramp & Sons Ship & Engine Building Co., because its bid of $1,195,000 each was only $5,000 under the limit of cost set by congress and afforded a margin so small that it would not permit of any changes which might be desired in the specification. The navy yard estimate, as is well known, does not take into account many important items that private yards must consider. It has been noted as a remarkable coincidence, if nothing more, that the Mare Island yard was given the contracts only a few days after a request that this be done had been made upon Secretary Daniels by President Haggerty of the California Federation of Labor, and another official of that organization. They were introduced to Secretary Daniels by President N. P. Alifas of the machinists' union of the Washington navy yard.

Ship Steel Rate

Washington, Nov. 28.—The Newport News Ship Building & Dry Dock Co., Newport News, Va., has filed a complaint with the interstate commerce commission, protesting against the rate of 21.3c per 100 pounds on ship steel from the Pittsburgh district to Newport News. The rate is declared to be unreasonable and excessive and to discriminate against the complaint in favor of ship building companies at New York, Boston and Portland, Me., which pay a rate of 16.9c per 100 pounds from the Pittsburgh district. The Newport News company contend that it should be granted the 16.9c rate, and seeks reparation on shipments of steel during the past two years based on the difference in the rate it and its competitors pay. The company says it uses at least 500 cars of steel annually from the Pittsburgh district, each car carrying approximately 70,000 pounds. In view of the extreme activity in the ship building industry, and of new contracts being taken for naval and merchant ship construction, the complaint created unusual interest.

Proposed Increases

Washington, Nov. 27.—Hearings will be held from Dec. 5 to 19 at the office of Assistant Secretary of the Navy Roosevelt on recommendations of wage boards as to proposed scales to be paid workmen at the various navy yards, and other department institutions, beginning with Jan. 1. These recommendations have not been made public, but it is said that they proposed increased pay as a general thing.

More Open Hearths

Chicago, Nov. 27.—Inland Steel Co., Chicago, has decided to proceed at once with the construction of two additional open hearth furnaces. A battery of eight furnaces has just been completed, which will be increased to 10 by this addition. The former open hearths numbered 12. This will give Inland a battery of 22 furnaces.

Five or six of the eight completed furnaces in the new battery are producing steel to the capacity of the mill to handle it. The remainder await completion of rolling equipment before starting to produce steel.

The Scullin Steel Co., St. Louis, is about to add three 30-ton open hearth furnaces, giving a battery of 11 furnaces, with a monthly capacity of 13,000 to 14,000 tons per month. The company produces steel which is cast into billets for the merchant market.

The Wine Railway Material Co., Toledo, will build an addition to its plant in that city which will double its capacity. The work on the new building will be started Jan. 1, 1917. The most modern machinery will be installed and a yard to be used for the storage of steel stock will also be added. With these improvements, about 3,000 tons of steel and 1,500 tons of malleable castings will be used in the plant annually.

Coke By-Products

Heavy Sales of Benzol, Toluol and Phenol Last Week

New York, Nov. 27.—A buoyant tone now characterizes the market on leading coke-oven by-products as the result of a heavy volume of sales in benzol, toluol and phenol, during the past week. Some of these contracts have been of tremenodus size, calling for many hundreds of thousands of gallons or pounds, according to the product and foreign buyers have been among the heaviest purchasers, especially in toluol and phenol. These bookings will absorb a considerable fraction of the total output of 1917, and they have strengthened the market.

Domestic buying of benzol has predominated and there has been widespread covering for various industrial purposes. Offerings have been reduced appreciably. Both spot and contract benzol now firmly are held by the larger interests at from 55 to 60 cents per gallon. Some resale lots for spot still are offered, but the demand has been so strong that these have had no weakening effect. Large contracts for toluol have been closed by manufacturers of trinitrotoluol which will take up most of the offerings for the first half of 1917. The United States government, which took alternate bids Nov. 21 on 150,000 gallons of toluol, or its trinitrotoluol equivalent, is expected to close for its requirements with the Hercules Powder Co. Trinitrotoluol probably will be purchased for delivery over the next 18 months. On some of the large toluol contracts closed in the week, $2 per gallon, was shaded. On ordinary business, however, $2 prevails. Spot tuluol is from $2.50 to $3, with limited offerings.

In phenol, some export sales of enormous proportions for 1917 have been closed which will clean up a considerable portion of the first half supply. Prices are very strong at from 50 to 55 cents, per pound.

A demand in excess of supply for early shipment continues to force the sulphate of ammonia market steadily upward. Prices this week again are quoted at from $3.92 to $3.97, per 100 pounds, at tidewater.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.	
Pure benzol	$0.55 to 0.60
Toluol	2.50 to 3.00
Solvent naphtha	.25 to .30
Per Pound at Producers Plant.	
Phenol	.50 to .55
Per 100 Pounds at Seaboard	
Sulphate of ammonia	$3.92 to 3.97

Contract.

Per Gallon at Producers Plant.	
Pure benzol	$0.55 to .60
Toluol	2.00
Solvent naphtha	.25
Per Pound at Producers Plant.	
Phenol (nominal)	$0.50 to .55
Per 100 Pounds at Seaboard	
Sulphate of ammonia (nearby)	$3.92 to 3.97

Many Interests Hammer Market

Munition Plants Buy Widely and Ship Building Companies Continue to Issue Huge Lists—Shell Making Equipment for Sale in Pittsburgh Starts Rumor That Shell Contracts Will Cease

DEMAND for machine tools refuses to show any diminution; in fact, the indications are that current business is on a larger scale than for several weeks past. A number of concerns throughout the east are buying one or more machines each and the outlay involved in these small orders forms a large total. This business is coming from concerns representing practically every line of industry. The railroads, however, still are participating on a small scale. About the only buying of importance from these interests is comprised in orders from the Lehigh Valley and the Baltimore & Ohio. These roads bought a few tools each. One of the biggest buyers at present is the Morgan Engineering Co., Alliance, O. This concern is building a large erecting shop and, although it has bought a large number of tools, still is in the market for important requirements, principally heavy tools, such as large boring mills, planers, etc. A representative of the Morgan company is traveling through the various machine tool centers in an endeavor to secure such tools for the best possible delivery. Another important buyer has been the Pusey & Jones Co., Wilmington, Del., which has bought machine shop equipment involving an expenditure of about $100,000. Another large buyer is the Beach Mfg. Co., Montrose, Pa., manufacturer of woodworking machinery, whose plant was damaged by fire, Nov. 24. This company immediately telegraphed for representatives of a large number of machinery concerns, and is placing orders for an entire new machine shop equipment. The Colt's Patent Firearms Mfg. Co., Hartford, Conn., has bought on a fairly large scale its requirements, including principally turret lathes. The Standard Ship Building Corporation, 44 Whitehall street, New York, has not yet bought any of the equipment included in its $100,000 list, but is expected to close without much further delay. The Seattle Ship Building & Dry Dock Co., which plans to establish a plant in Seattle, again has entered the market for additional equipment involving a comparatively large outlay. The announcement that Charles W. Morse, president of the United States Steamship Co., 50 Broad street, New York, has bought a site near New London, Conn., on which he will establish a large ship yard, is believed to foreshadow much buying of ship yard equipment by this interest. The United Motors Corporation, it is expected, shortly will purchase a large amount of machine tool equipment to be installed in a large addition to the Harrison Mfg. Co. plant at Lockport, N. Y., which it recently purchased. The Locomobile Co. of America, Bridgeport, Conn., recently has been a purchaser of machine tools. Heavy buying is expected to be done by the Steelwhite Co., recently organized to build a plant at Jamestown, N. Y., for the manufacture of enameled steel furniture.

Safety Night Light Co., 147 Jackson street, Brooklyn, shortly will extend its capacity. The Merrill Spring Co., New York, is about to erect an addition. The Cheshire Brass Corporation, Cheshire, Conn., is erecting a new casting shop and is making other improvements which will increase its output approximately five times. The Hemphill Machine Co., Central Falls, R. I., is erecting an addition which will increase its output 50 per cent. Harvey Hubbell, Inc., Bridgeport, Conn., maker of electric specialties, is about to erect a plant addition. George S. Youngs, Bridgeport, Conn., is erecting a new plant for the manufacture of casting copper, brass and aluminum ingots, etc. The Electric Cable Co., Bridgeport, Conn., is erecting a new addition. The Berrethal Machine Co., Suffolk, Va., is building a new foundry. The Troy Engine & Machine Co., Troy, Pa., is about to erect a new foundry. The York Wire Cloth Co., York, Pa., is about to erect an addition. The H. A. May Foundry Co., Philadelphia, is commencing the erection of a new foundry. The Franklin Machine Co., Providence, is about to erect two new foundry additions. The Mansfield Foundry Co., Mansfield, Mass., is about to double its capacity. The Greenfield Machine Co., Greenfield, Mass., has let a contract for the erection of a shop addition. Extensive shop additions are to be erected at the Watervliet, N. Y., arsenal. The Durston Gear Co., Syracuse, N. Y., shortly will increase its capacity. The Ridge Avenue Iron & Metal Co., Philadelphia, is about to erect a new machine shop.

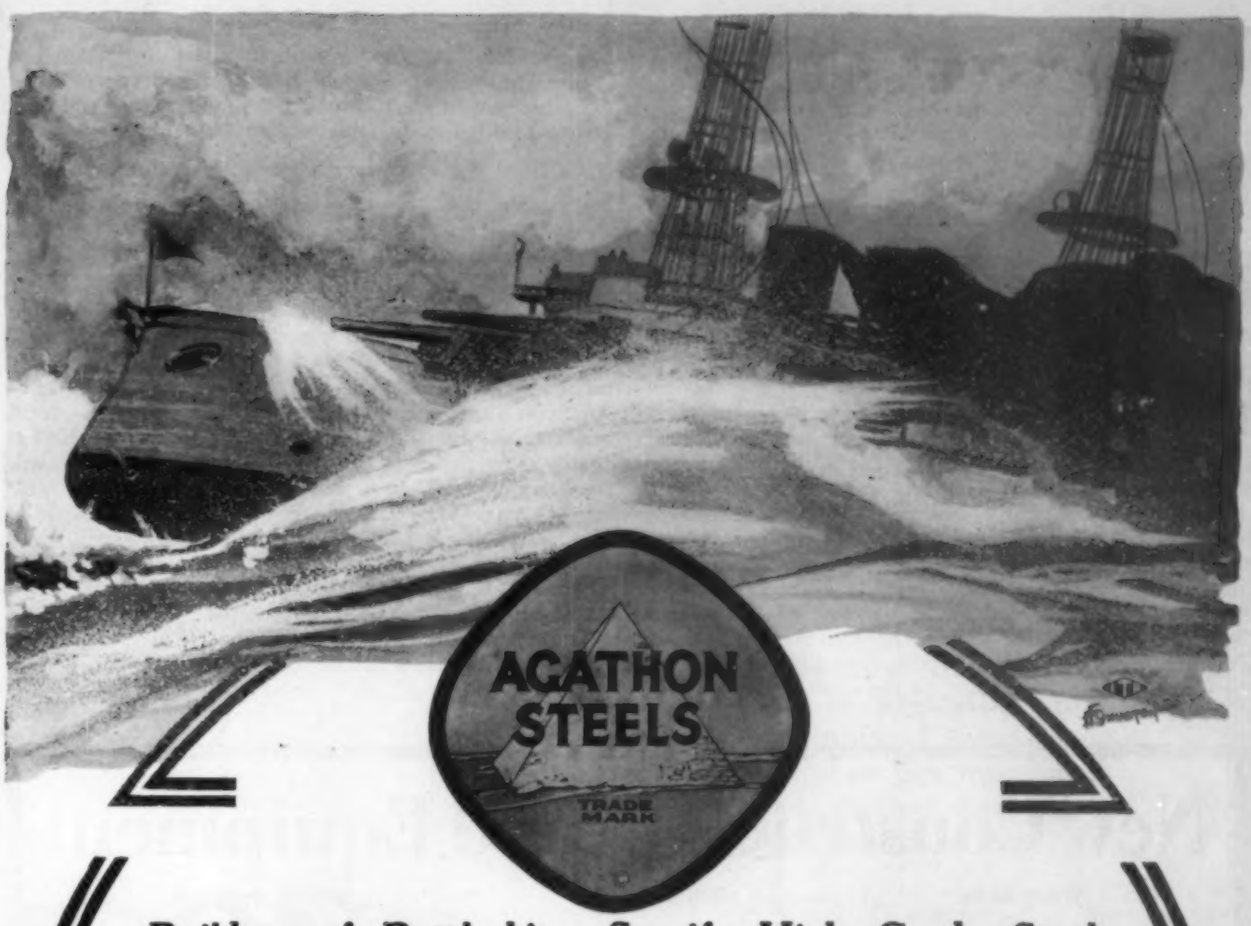
Prices Are Going Up

CHICAGO dealers in machine tools find a steady volume of business, mostly in single tools or small lots, with an occasional order running into larger numbers. The business is coming from established concerns who find they must add to their equipment to keep up with business, and most of the sales now being made will be delivered from April to August. Prices are advancing steadily. One seller in Chicago finds machinery on his floors now averages $1,000 per tool, against $400 before the present active market developed. The Santa Fe Railroad Co., N. J. Collins, general purchasing agent, Chicago, is inquiring for a combined vertical and radial car borer, a 42-inch plain vertical drill press, a 54-inch vertical boring and turning mill, and an automatic car gaining machine with a 12-foot table.

Munition-Making Equipment for Sale in Pittsburgh

MANUFACTURERS of munitions at Pittsburgh have not been able to verify reports to the effect that England and France soon will withdraw from the American market as buyers of finished shells. The Westinghouse interests are working on large contracts for shells and fuses, all of which will not be completed until the latter part of the first quarter of 1917. It is stated by munition makers that numerous inquiries are pending for shells. On the other hand, it is known that one war equipment maker is offering considerable shellmaking machinery for sale.

The Pittsburgh-Des Moines Steel Co., which has been an active buyer of fabricating equipment the last few months, virtually completed its buying program a few days ago, when it closed for two punches of medium size with the Cleveland Punch & Shear Co.,



Builders of Battleships Specify High Grade Steel

When it comes to the crisis, the battleship must be ***there***—and be there ***strong.*** Just one weak spot may prove an unredeemable disaster—particularly down in the engine room.

AGATHON STEELS

are made especially for the production of ***Connecting Rods, Crank Shafts, Driving Shafts, Pistons, Cams, Gears, etc.***
They insure safety, durability, reliability, economy.
Engine Builders who use AGATHON STEELS will be well rewarded.

PROTECT YOUR REPUTATION

"AGATHON" Chrome Nickel
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"AGATHON" Nickel Steels
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon
"AGATHON" Special Analyses

Our shipping facilities are favorable to speedy delivery anywhere

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Building, F. Walter Guibert, District Representative
Cleveland Office: Hickox Building, The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Building, 14 East Jackson Blvd., A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents.

Cleveland. The Pittsburgh-Des Moines concern has purchased approximately $100,000 worth of new equipment since July 1, last. The National Tube Co. is negotiating for a large bar shear for installation in its plant at Ellwood City, Pa. The H. Koppers Co., Pittsburgh, is in the market for punching and shearing equipment for the Seaboard By-Product Coke Co., an allied interest. The Morgan Engineering Co., Alliance, O., and the Case Crane & Engineering Co., Columbus, O., have received orders for a 25 and 15-ton crane, respectively, for installation in the new plant of the Penn Mold & Mfg. Co., Wheeling, with works at Dover, O.

Diversified Inquiry in Cleveland

NO INQUIRIES of any magnitude have appeared in the Cleveland machine tool market during the past week. The demand is for a diversified line to equipment. Grinders, boring machines and lathes are called for frequently. Milling machines and planers are finding a ready market. The General Electric Co. is still in the market for equipment for its plant at Erie, Pa. The American Steel & Wire Co., Cleveland, has not yet closed on all of the tools for which it inquired some time ago. The Cleveland Crane & Engineering Co., Wickliffe, O., is in the market for an electric drill. The plant of the Zahner Metal Sash & Door Co., Canton, O., was seriously damaged by fire recently and has issued inquiries for complete equipment. The Johnson Bronze Co., New Castle, Pa., is interested in heat-treating furnaces and has issued an inquiry for this kind of equipment.

Manufacturers Curb 1917 Sales

BUYING of machine tools in Cincinnati continues in small lots and for single tools. Inquiry is not as heavy as during the second or third quarter. A number of plants have caught up on orders, so that deliveries on all kinds of machine tools can be made in a few weeks after contracts have been placed. Prompt shipment of new tools has caused business on second-hand machines to fall away slightly. Manufacturers show a tendency to curb sales for the second quarter and last half of 1917, because of the uncertainty of prices. J. Huesman, Cincinnati, will need equipment for a machine tool shop to be built in that city. The Cincinnati Sheet Metal & Roofing Co., about to erect a new fire-proof factory, will need equipment. The Warren City Tank & Boiler Co., Warren, O., will build a factory building, for which no equipment has been contracted. The Frankfort Automobile Co., Frankfort, Ind., is in the market for a list of tools to be used for the manufacture of automobiles.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

BENNINGTON, VT.—The Bennington Scale Co. is about to erect a 2-story, 40 x 60-foot plant addition.

BRATTLEBORO, VT.—The S. S. Smith Mfg. Co., maker of toys, has let a contract for the erection of a 40 x 140-foot addition.

SPRINGFIELD, VT.—The Lovejoy Tool Co. has been incorporated with $150,000 capital by James Hartness, Fred P. Lovejoy, Charles N. Safford, Ralph E. Flanders and William H. Beardsley.

BOSTON.—The Taylor Machinery Co. has been incorporated with $13,000 capital by George Taylor, Thomas Irving and Gladys E. Bezanson.

BOSTON.—The National Safety Lift Co. has been incorporated to make elevators with $50,000 capital by Jerome B. Norton, Marie R. Norton and W. Howard Pope.

BOSTON. — The Quick Lock Demountable Rim Co. has been incorporated with $50,000 capital by James Norris, Charles F. Crowell and James W. Stevens.

BOSTON.—The plant of the S. A. Woods Machine Co., 32 Damrell street, South Boston, was damaged slightly by fire Nov. 13. The company is engaged in the manufacture of shells.

CAMBRIDGE, MASS.—The Monarch Metal Mfg. Co., 45 Haverhill street, Boston, is about to remodel its plant here.

CHELSEA, MASS.—The Mexican Petroleum Corporation, 120 Broadway, New York, is about to build an oil distributing system at Chelsea, Mass., to cost about $300,000.

CHELSEA, MASS.—Cutler & Birckman are about to erect a 3-story, 42 x 80 x 44-foot addition.

EVERETT, MASS. — The General Electric Co. has let a contract for the erection of a 1-story, 115 x 200-foot pattern shop.

GREENFIELD, MASS.—The Greenfield Machine Co. has let a contract for the erection of a 1-story, 50 x 100-foot addition.

MANSFIELD, MASS.—The Mansfield Foundry Co. has acquired the old Rider foundry here and is about to double its capacity. It has begun work on the erection of a 60 x 100-foot addition.

MERRIMAC, MASS.—The plant formerly occupied by the Eastern Hard Fibre Co., containing about 18,000 square feet has been leased to the Commonwealth Toy Corporation, a newly organized company which will begin operation about Jan. 1.

SPRINGFIELD, MASS.—The Springfield arsenal will erect an addition to its milling shop.

SPRINGFIELD, MASS. — Plans are being drawn for a brick and reinforced concrete, fireproof, 11-story, 66 x 107-foot hotel at Dwight and Worthington streets for the Colony Hotel Co.

WOBURN, MASS.—The Merrimack Chemical Co., Boston, will build a brick, 1-story, 30 x 60-foot office building on New Boston street.

WORCESTER, MASS.—The American Steel & Wire Co. has let a contract for the erection of a 1-story, 59 x 191-foot shop.

CENTRAL FALLS, R. I. — The Hemphill Machine Co. is erecting an addition which will increase its output of knitting machines about 50 per cent. The addition is to be completed by Jan. 1.

EAST PROVIDENCE, R. I.—The Standard Oil Co., of New York, contemplates the erection of a distributing station to cost $500,000 on 38 acres with a 2,000-foot front on the Providence river.

HILLSGROVE, R. I.—Fire damaged the No. 2 foundry building of the Rhode Island Malleablet Iron Works causing a loss of $40,000.

PAWTUCKET, R. I.—The American Textile Co. has awarded contract for a brick, mill construction, 2-story, 71 x 35-foot mill off Main street.

PROVIDENCE, R. I. — The Franklin Machine Co., 189 Charles street, is about to erect two foundry additions, 34 x 98 and 56 x 140 feet, respectively.

PROVIDENCE, R. I.—The M-B Tool Co. has been incorporated to manufacture machinery and tools with $30,000 capital by Louis G. Massicotte, Robert D. Banigan and John J. Banigan.

BRIDGEPORT, CONN. — The Locomobile Co. of America is about to erect a 1-story, 100 x 160-foot addition.

BRIDGEPORT, CONN.—The Electric Cable Co., 480 Bunnell street, has let a contract for

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IRON ORE

Do you realize that the supply of iron ore for the coming year is much smaller than it has been—that there is only a limited amount to be obtained?

Do you realize that those who are delaying or neglecting to order their supply of iron ore, may wake up some fine morning and discover that they have delayed just a little bit too long?

Then act promptly!

Shipments of our Lake Superior Iron Ores are made from *Open Pit Mines.*

We are in a most excellent position to interest you in *Ser-.ce, Quality* and *Price.*

Don't take chances on your 1917 ore.

Let us know your requirements.

Crawford Ore; Lambert Ore;
Pennington Ore.

The Tod-Stambaugh Company

Perry Payne Building

CLEVELAND - - OHIO

the erection of a 4-story, 58 x 130-foot addition.

BRIDGEPORT, CONN. — Harvey Hubbell, Inc., has let a contract for the erection of a 1-story, 30 x 90-foot manufacturing building.

BRIDGEPORT, CONN.—The Eastern Brass & Ingot Co. has filed notice of its intention to change its location to Waterbury.

BRIDGEPORT, CONN.—The Automatic Machine Co. will build a storage warehouse on East Washington avenue.

BRIDGEPORT, CONN. — The Geo. S. Youngs Co., Stella avenue, has started work on the erection of a 1-story, 72 x 96-foot foundry addition.

BRIDGEPORT, CONN.—The Lake Torpedo Boat Co. has let a contract for the erection of a machine shop addition to cost about $13,000, not including equipment.

BRIDGEPORT, CONN. — The Bridgeport Projectile Co. is about to begin work on the erection of a 2-story, 120 x 300-foot addition to its plant.

CHESHIRE, CONN. — The plant of the Cheshire Brass Corporation, recently taken over by John E. Liggett, of Liggett- Hichborn & Co., Boston and New York, Russell A. Cowles, vice president of the Buffalo Copper & Brass Rolling Mill, Buffalo, and president of the Metal Trading Corporation, 99 John street, New York, and others, is being enlarged to about five times its former capacity. A new casting shop now is being erected.

CHESHIRE, CONN.—The Connecticut Brass Co. has let contract for erection of 1-story, 40 x 140-foot casting shop.

DANBURY, CONN.—The New York, New Haven & Hartford railroad has let contract for the erection of round-house and repair shop here.

HARTFORD, CONN.—The Ennis Auto Top Co. has been incorporated with $25,000 capital by E. L. Ennis, E. S. Fenning and E. M. Fenning.

HARTFORD, CONN.—The Eastern Motors Co., recently formed here with $1,000,000 capital by Willis D. Upson, Waterbury, Fred A. Law, Hartford, John F. Turk, New York and others, plan to erect a large plant here for the manufacture of medium-price automobiles.

HARTFORD, CONN. — The Hartford Machine Gun Co. has been incorporated with $100,000 capital to manufacture all kinds of machine or rapid fire guns, rifles, explosives and ammunition by E. Henry Hyde, William C. Hungerford, New Britain and Theodora Ellsworth, East Windsor.

MIDDLETOWN, CONN.—The J. O. Smith Mfg. Co. has let contract for 3-story, 26 x 53-foot plant addition.

NEW LONDON, CONN.—The J. N. Lapointe Co. is completing a 4-story, 55 x 160-foot addition to its plant, for the manufacture of broaching machines. Arrangements are being made for the use of cranes.

NEW HAVEN, CONN.—The Beach Mfg. Co. has been incorporated to make military and naval equipments and ordnance materials with $500,000 capital by Harry G. Day, W. J. Beach and Thomas M. Steele.

STAMFORD, CONN.—The Stamford Rolling Mill Co. has let contract for erection of several additions.

WATERBURY, CONN. — The Waterbury Castings Co. has let a contract for the erection of a 1-story addition.

WATERBURY, CONN.—The Scovill Mfg. Co. has let contract for a brick, mill construction, 1-story, 114 x 116-foot factory on Hamilton avenue.

From the Alleghenies to the Sea

BROOKLYN. — Wm. Koenig, 226 Henry street, has had completed by Architect A. G. Carlson, 226 Henry street, plans for an addition to his plant.

BROOKLYN. — The Greenpoint Metal Covered Door Co. has had completed plans for the erection of a 130 x 200-foot plant to be erected at Ingraham street and Garden avenue.

BROOKLYN.—The Safety Night Light Co., 147 Jackson avenue, is having drawn by Architects Laspia & Salvati, 525 Grand street, plans for a 1-story and basement, 50 x 100-foot shop building.

BUFFALO.—The King Sewing Machine Co. will erect a $20,000-factory addition to its plant at Rano and Welland streets.

BUFFALO. — The United Motors Corporation, purchasers of the Harrison Mfg. Co., Buffalo, has bought a 23-acre site on which it will build an addition requiring about 400 more hands.

BUFFALO.—The Transmission Ball Bearing Co., in which W. N. Murray and C. M. Murray, Toronto, Can., and 32 Wells street, New York, are interested, is about to erect a 1-story, 20 x 100-foot plant here.

JAMESTOWN, N. Y.—The Steelwhite Co. is about to erect a 2-story, 105 x 163-foot manufacturing building.

LOCKPORT, N. Y.—The plant of the Harrison Mfg. Co., one of the largest industries here, has been sold to the United Motors Corporation for $1,000,000. Options also have been taken on available sites and a big addition to the present plant will be constructed at a cost of about $300,000.

LONG ISLAND CITY, N. Y. — Gustave Steiner, 596 Jackson avenue, has let a contract for the erection of a 3-story, 50 x 100-foot automobile repair shop and garage.

NEWBURGH, N. Y.—The Texas Co., 17 Battery place, New York, will build an oil station here to comprise three buildings.

NEW YORK.—The Merrill Spring Co. is about to erect an extension to its plant.

NORTH TONAWANDA, N. Y.—Plans for a 3-story, 67 x 102-foot addition to the plant of the Rand Co., are being revised.

NORTH TONAWANDA, N. Y.—The Buffalo Sled Co. is having drawn by Engineer Wm. Steele & Sons Co., 1600 Arch street, Philadelphia, plans for a plant and warehouse to be erected at a cost of about $150,000.

PHELPS, N. Y.—The Bennett Corporation, in which W. J. Bennett, Sietz building, Syracuse, N. Y., is interested, is having drawn by the Kennedy Engineering Co., 120 Broadway, New York, plans for a cement plant to be erected here at a cost of $1,250,000.

POUGHKEEPSIE, N. Y. — The Dutchess Mfg. Co. has let a contract for the erection of 3-story and basement, 41 x 95-foot plant addition.

ROSEBANK, S. I., N. Y.—L. A. Dreyfus, Belair road, has let a contract for the erection of a 4-story manufacturing building.

STEINWAY, L. I., N. Y.—Oakes Mfg. Co., manufacturer of dyestuffs, has let a contract for the erection of a 2-story, 32 x 200-foot addition.

SYRACUSE, N. Y.—Plans are being drawn by Architects Faber and Baxter, Gurney building, for a 1-story, 50 x 108-foot manufacturing building, to be built for the Durston Gear Co.

TROY, N. Y.—The Interstate Machine Co. has let a contract for the erection of a 2-story, 33 x 60-foot plant.

UTICA, N. Y.—Hart & Crouse, 301 Turner street, will build a 100 x 150-foot core shop.

WATERVLIET, N. Y.—Contract has been let to the C. P. Boland Co., 30 Fourth street, Troy, for the erection of extensive additions to shop buildings at the Watervliet arsenal.

ARLINGTON, N. J.—The Salmond Bros. Co., 526 Elm street, is about to erect a 1-story, 80 x 80-foot shop addition.

BELLEVILLE, N. J.—The Kent Motors Corporation, recently organized with $1,000,000 capital has purchased a site here and will begin the erection of a plant immediately. It is expected that manufacturing operations will begin next February and that the capacity of the plant will be 10,000 cars the first year. Mayor Thos. F. Raymond, Newark, is among the directors of the new concern.

ELIZABETH, N. J.—The Smidth-Lewis Co., just incorporated with a capital of $10,000, is to locate an iron foundry here at North avenue and Meadow street. John J. Griffin, 88 Steuben street, East Orange, N. J., is a stockholder.

HOBOKEN, N. J.—Lehman Bros., 401 Jefferson street, are about to erect a new smelting shop.

MAYS LANDING, N. J.—In addition to the ordnance proving ground which the Bethlehem Steel Co. is locating on a 10,000-acre tract near here, it is reported as likely that the company also will engage in the manufacture of airplanes here.

MORRISTOWN, N. J. — The Stoneware Electric Stove Co., newly incorporated, contemplates the erection here of a plant for manufacturing electric stoves and heating devices. Arthur O. Christensen, 45 Prospect street, Dover, is the largest stockholder.

NEWARK, N. J. — The Oxweld Acetylene Co., 646 Frelinghuysen avenue, has let contracts for the erection of three additions to include a 1-story, 42 x 64-foot storage building, a 1-story, 45 x 55-foot brass foundry and a 1-story, 25 x 43-foot garage.

PERTH AMBOY, N. J.—The rod mill of the Standard Underground Cable Co. was damaged slightly by fire on Nov. 14.

PERTH AMBOY, N. J.—The Raritan Copper Works has been granted a permit to erect four additional plant structures.

ELLWOOD CITY, PA.—The Ellwood City Foundry Co.'s new buildings are being rapidly completed and shortly will be ready for the installation of new equipment.

FRANKLIN, PA.—The Franklin Foundry Co. will erect an addition to cost $10,000.

PHILADELPHIA.—The Ridge Avenue Iron & Metal Co. will build a 1-story, 68 x 160-foot machine shop on Twenty-ninth street.

PHILADELPHIA.—The H. A. May Foundry Co., S. L. Levy, president, Thirtieth and Ludlow streets, is commencing the erection of a 1-story, 60 x 150-foot foundry.

PHILADELPHIA.—A large machine shop duplicating the shop recently awarded for the Norfolk navy yards is being planned by the government for the League Island navy yard, this city.

STEELTON, PA.—The Steelton & Highspire Railroad Co. has been incorporated with $250,-

Success depends upon Progression!

Progression depends upon Action!

WISHING

alone never got anybody very far

The men that succeed, and the ***concerns*** that succeed, are the ones that DO things—the ones that are always on the job to take advantage of improvements.

Young Japanning and Drying Ovens

are a great improvement over other ovens—so great an improvement that there is no comparison.

ARE *YOU* A *"WISHER"* OR A *"DOER"*?

INSTALLATION OF YOUNG BROTHERS OVENS IN THE PLANT OF WILLYS-OVERLAND CO.

Young Ovens

Have these advantages over other ovens

1. They decrease time and labor.
2. They decrease fuel expense.
3. They prevent great loss of heat.
4. They provide proper ventilation.
5. They maintain a constant circulation.
6. They produce a uniform heat.
7. They provide a complete combustion.
8. They facilitate production.
9. They minimize production costs.
10. THEY MAXIMIZE RESULTS.

Let us send you the interesting details

YOUNG BROTHERS CO.

Russel and Franklin St. Detroit, Mich.

000 to connect the Steelton and Highspire plants of the Bethlehem Steel Corporation. Quincy Bent is president of the new company.

TROY, PA.—The Troy Engine & Machine Co. is about to erect a 1-story, 50 x 194-foot foundry.

WILLIAMSPORT, PA.—The K. K. Messer Co. is about to erect a 1-story, 46 x 400-foot plant. The Westinghouse, Chuch, Kerr Co., 37 Wall street, New York, is the engineer.

YORK, PA. — The New York Wire Cloth Co., F. T. Alvord, general manager, has let a contract for the erection of an addition.

WILMINGTON, DEL. — The Victor Motor Vehicle Co., H. Frier, Perry building, has let contract for the erection of a 1-story, 100 x 160-foot plant.

BALTIMORE. — Baltimore Enamel & Novelty Co. is about to erect a 2-story, 250 x 456 foot plant.

WASHINGTON. — The Anderson Tin Mfg. Co., Union Trust building, is about to erect a 1-story boiler house.

Pacific Coast and Western Canada

ALAMEDA, CAL.—The Union Iron Wks., San Francisco, will build a power house at the ship building plant at Alameda, costing $22,500.

CORCORAN, CAL.—The Corcoran Water & Gas Co. will let a contract soon for a 50,000-gallon steel tank on an 80-foot tower and for the installation of pumping machinery at a cost of about $10,000.

LOS ANGELES, CAL.—The Warman Steel Casting Co. will build a foundry plant at Huntington Park at a cost of $100,000, and will remove its present plant from Redondo Beach.

MARTINEZ, CAL.—The Richmond Machine & Boiler Works has been incorporated by Fred Reichert, E. Ott and A. J. Timmons.

MERCED, CAL. — The Crocker Hoffman, Land & Water Co., H. A. Large, manager, will let a contract soon for a 300,000-gallon steel tank on a 120-foot steel tower and a 150-horsepower pumping plant.

OAKLAND, CAL.—The Atlas-Imperial Engine Co. is building an addition to its plant, 80 x 360 feet.

RIO VISTA, CAL.—Plans are being made for a joint county bridge, 2,400 feet long to cost $170,000, which will be built next spring.

RIVERSIDE, CAL.—The contract will be let soon by the board of supervisors for a steel girder and truss bridge over Live Oak canyon.

SAN DIEGO, CAL.—The bureau of yards and docks, navy department, will take bids till Nov. 20 on a locomotive crane for the naval coal depot here.

SAN FRANCISCO. — The Pacific Coast Steel Co. will enlarge its plant at an expense of $50,000.

STOCKTON, CAL. — The Standard Steel Co. will build a plant near Stockton. J. M. Benham is president.

SEATTLE.—The Puget Sound Boiler Works is building a 1-story addition 40 x 90 feet.

SEATTLE.—The Western Gear Works, 1706 Fourth avenue, will build a 2-story plant, 112 x 120 feet at Ninth avenue and King street.

SEATTLE. — The Burbank Machinery Co. has been incorporated with $10,000 capital stock by L. A. Nutter, F. S. Burbank and C. E. Mack.

SEATTLE.—The Automatic Window Screen Mfg. Co. has been incorporated with $100,000 capital stock by O. D. McMillan and J. K. Schenck.

SEATTLE. — The Puget Sound Traction Light & Power Co. and subsidiary companies will spend $1,215,000 for construction and extension work the coming year. This will include work on power plants, track and trestle work, etc.

SPOKANE. — The Great Northern railway is to develop the Chelan river and Lake Chelan hydro-electric power scheme the coming year to develop sufficient power to operate the company's lines from Spokane to Seattle. It is also possible that the coast line of the Great Northern from Vancouver, B. C., to Portland will be included in the development. This would mean the electrification of 500 miles of line and the expenditure of $16,000,000 to $20,000,000.

TACOMA, WASH. — The Bilrowe Alloys Co., manufacturer of ferro-tungsten, ferro-manganese and other alloys is considering enlarging its plant.

ASTORIA, ORE.—The Columbia Iron & Welding Co. has been incorporated with $27,000 capital stock by John Weinberg, William Silva and A. Steinberg.

ASTORIA, ORE. — The American Ship Building Co. is to construct a plant here. Contracts have been closed for wooden ships of the auxiliary type and keels will be laid for six vessels in the near future. Harry Spear, head of the concern, is here looking after the business.

COQUILLE, ORE.—Bids will be received by the county court of Coos county, Ore., up to Nov. 15 for construction of a 180-foot steel span bridge over the South fork of the Coquille river near Myrtle Point. Certified check for five per cent of bid payable to county court required.

EUGENE, ORE.—The Eugene Iron Works is erecting two additions, 40 x 68 feet and 40 x 40 feet.

McMINNVILLE, ORE.—City engineer, R. W. Jones, estimates that the proposed waterworks extension to the Haskins creek project will call for four miles of 14-inch pipe and eight miles of 12-inch pipe. Machine banded wood pipe would cost $65,000; dipped steel pipe $125,000, and cast iron pipe $160,000.

OGDEN, ORE.—The Western Foundry & Machine Co. will build a new foundry casting $100,000 on the site of its present plant.

PORTLAND, ORE. — The Coin Machine Co. will build a 1-story foundry.

Activities in the Central States

CANAL DOVER, O.—The Penn Mold & Mfg. Co. which recently was incorporated with $200,000 capital, will erect a foundry to manufacture steel in ingot molds on West Third street. J. C. Heinlein, of the Penn Mold company, states that the building will be of steel and concrete construction and that a large crane will be installed.

CANTON, O.—The Gillan Mfg. Co. is said to be planning to increase its capital by $200,000 to provide for extensions to its plant.

CINCINNATI.—The Triumph Mfg. Co. will build an addition, 32 x 80 feet in the rear of its plant in Camp Washington. Plans are being prepared.

CINCINNATI. — A heating and ventilating plant will be purchased for Windsor school by the board of education. The cost will be about $15,000.

CLEVELAND.—The Abbott Corporation will erect a $110,000, 1-story factory building at 1131 East 152nd street.

CLEVELAND. — The Carbo-Hydrogen Co., Pittsburgh, will erect a $10,000 manufacturing building at 2514 Center street.

CLEVELAND.—Architects Knox & Elliott, 1046 Rockefeller building, are preparing plans for a factory building for the J. A. Wigmore Co., P. A. Fryer, general manager, 1330 Williamson building. The building will be 3-story and will cost about $50,000.

CLEVELAND. — The Globe Machine & Stamping Co. will erect a $15,000 storage building at 1230 West Seventy-sixth street.

CLEVELAND.—The Poe Engineering Co., Rockefeller building, is taking bids for a factory addition for the Lowe Mfg. Co., Madison avenue and West Ninetieth street.

CLEVELAND.—John Kleinbohl will erect a brass manufacturing plant on Hamilton avenue and East Forty-ninth street. The plant will be 102 x 120 feet and will cost $40,000.

CLEVELAND.—The Commercial Motor Co., Leader-News building, plans manufacturing a 1-ton delivery truck and will erect a plant on a site to be selected shortly.

CLEVELAND.—The Farad Electric Co. has been incorporated with $500,000 capital, by E. A. Foote, A. R. Manning, F. S. McGowan and others, to manufacture electrical devices.

CLEVELAND.—The Youmans Machine Co. has been incorporated with $50,000 capital by G. A. Welch, J. C. Barley, G. B. Siddall, W. H. Staring and J. P. Dempsey.

FRANKFORT, IND.—The Frankfort Automobile Co., Dr. Ragsdale, secretary, will take bids soon on an automobile plant 60 x 100 feet and 60 x 200 feet, 1-story. Charles E. Bacon, 617 Merchants Bank building, Indianapolis, is engineer.

INDIANAPOLIS. — The National Motor & Vehicle Corporation, a new concern incorporated with $5,000,000 capital, has taken over the plant of the National Automobile Co. and will build additions.

NEWCASTLE, IND.—The Motor Parts Co. is building an addition 80 x 180 feet.

AURORA, ILL. — The All-Steel Equipment will let contracts shortly for a factory 80 x 300 feet.

BLOOMINGTON, ILL. — The city council will spend $15,000 for improvements at the municipal electric light plant.

CHICAGO.—The Ajax Forge Co., 2499 Blue Island avenue, will build a 1-story addition to cost $35,000.

CHICAGO.—The American Truck & Wheel Co. has been incorporated in Delaware to

manufacture motor truck and other wheels with $1,000,000 capital by W. C. Loftus, John R. Cavanaugh and Ross J. Cavanaugh, all of Chicago.

CHICAGO. — The Angert Wire & Iron Works, 6028 Grove avenue, will build a new factory to cost $75,000.

CHICAGO HEIGHTS, ILL.—The Steel Fabricating Co. is in the market for a 48 to 72-inch gate shear, ½-inch capacity and a heavy duty gang punch, 5 to 8 feet long.

CICERO, ILL. — The Automatic Screw Machine Products Co., 416 West Grand avenue, Earl E. Norman, president, will build a 1-story plant, 56 x 300 feet.

FAIRBURY, ILL.—The city council is investigating plans for a municipal electric light plant.

MOLINE, ILL.—The Moline Forging Co. is planning to build an addition for the production of heavy forgings.

ROCK ISLAND, ILL.—Colonel George W. Burr, commandant of arsenal, will take bids in January for buildings for a field artillery plant, to cost $1,250,000.

SPRINGFIELD, ILL. — The Weaver Mfg. Co. is adding a manufacturing building, an office building and a heating plant.

DETROIT.—The board of water commissioners will receive bids until Dec. 12 for two 37,000,000-gallon, vertical, triplex, expansion, crank and fly-wheel pumping engines. H. A. Bilmartin, secretary.

DETROIT.—The Disco Electric Starter Corporation will build a new factory. S. W. Elston is president.

DETROIT.—The Monorail Co. of America has been incorporated with $50,000 capital stock by John C. Frost, Richard G. Lambrecht and Louis A. Ewald.

GRAND RAPIDS, MICH.—A factory building, three stories, 80 x 160 feet, will be built by the Kindel Bed Co. Plans have not been prepared.

HOLLAND, MICH. — The Western Tool Works plans to build an addition.

LANSING, MICH.—The Lansing Stamping & Tool Co. has increased its capital stock from $40,000 to $100,000 and will build additions to care for increased business. G. F. Conway is general manager.

ST. JOSEPH, MICH. — The Joliet Auto Specialties Co., Joliet, Ill., manufacturer of a special automobile top holder, has moved to St. Joseph and is occupying a plant here.

MILWAUKEE. — Bonds for $250,000 have been voted for a bridge at Oneida and Cedar streets. J. C. Kinney Jr., is superintendent of bridges.

MILWAUKEE.—The Universal Tool & Apparatus Co. has been incorporated with $15,000 capital by Oscar Werwarth and William Baum.

SPRINGFIELD, MO.—An election will be held Dec. 12 to vote on issuing $400,000 worth of bonds for a municipal electric light plant. T. J. Moore is clerk.

ST. LOUIS.—The F. C. Schwaner Machinery Supply Co. has been incorporated with $10,000 capital by L. E. Schwaner, E. P. Schwaner and B. E. Reed.

CENTERVILLE, IA. — The Southern Iowa Machinery Co., which recently was incorporated by A. W. Judy, president and manager, D. A. Lee, secretary, and D. W. Barnett, treasurer, has acquired the Goss foundry and machine shop and will enlarge these and install considerable new equipment.

DULUTH. — The Minneapolis Radiator Co. will build an addition to cost $40,000. J. R. McGiffert, Fifty-ninth avenue, is president.

ELY, MINN.—The Kawishiwi River Power Co. has been organized to build a hydro-electric power plant costing $1,500,000. T. W. Orbison, of Appleton, Wis., is engineer.

MINNEAPOLIS.—The Mueller Furnace Co. plans a factory to cost $70,000 at University avenue and Twenty-seventh street.

ST. PAUL.—The Northern Malleable Iron Works will build a foundry on Wells street.

WINONA, MINN.—The Gates City Iron Works, A. Brom, president, will build a plant on East Front street.

New Trade Publications

RAILWAY MOTOR CARS.—Rockford railway motor cars are described in a 12-page bulletin issued by the Chicago Pneumatic Tool Co., Chicago. The claim for the dependability and economy of these cars is particularly emphasized by several extracts from letters of customers showing how users of the cars are impressed by their performance. The cost of operation of the cars averages about 0.5 cents per mile. Complete specifications for all car models are tabulated.

BLUE PRINTING MACHINE. — The Buckeye Engine Co., Salem, O., has issued a folder descriptive of a new electric blue printing machine. A new oil governor, safety stop, automatic cut-out, and a movable lamp crane which reduces the height of the machine about 7 inches are features mentioned in the folder. The machine is made in sizes ranging in height from 7 feet 4 inches to 9 feet 10 inches, and in capacity from two prints 42 x 44 inches to two prints, 42 x 72 inches.

SMALL TOOLS.—The Pratt & Whitney Co., Hartford, Conn., has issued a 315-page catalog in which illustrations, technical data and features of Pratt & Whitney taps, dies, milling cutters, reamers, punches and drills are given. A large number of pages is devoted to descriptions of miscellaneous tools and tables of dimensions of various types of screws and threads. Lists of drill sizes and tables for reducing inches to millimeters and decimal equivalents of millimeters are also included. Tables showing drill size decimal equivalents, speeds, weights per foot, and per inch of bar material, wire gage standards, and tapers are also included. Formulas for taper shanks, and line drawings of methods for making keyways for milling cutters add to the value of the book.

PRESSES.—The Southwark Foundry & Machine Co., Philadelphia, has issued a number of bulletins describing various types of presses. Among the machines mentioned is a washer press which turns out washers from scrap sheets or plates or from new material. The action of the press is said to be simple, a complete washer being automatically produced at each stroke of the plunger. The machine may be driven by belt or by motor. A gross press designed for scrap material or for straightening twisted frames and castings is also described. Among the other machines illustrated is an extrusion press which operates in such a way that the annealing of the work is eliminated. Chilling is prevented by encasing the pressure chamber in a heating jacket in which a temperature of 600 degrees Fahr. is maintained.

BUILDING DESIGN AND CONSTRUCTION.—A series of seven folders descriptive of recently constructed factory buildings has been issued by Frank D. Chase, industrial architect and engineer, Peoples Gas building, Chicago. Interior and exterior views of the new plants of the Moline Malleable Iron Co., St. Charles, Ill.; Wilder Tanning Co., Waukegan, Ill.; Garden City Spring Co., Chicago; Temple Mfg. Co., Cicero, Ill.; Hammond Malleable Iron Co., Hammond, Ind.; and the American 3-Way Prism Co., Laporte, Ind., are shown and testimonial letters from officers of these companies are reproduced. One of the folders contains a tabulated record of the construction of the Moline Malleable Iron Co. plant, showing that the new buildings were completed and ready for occupancy three months after fire destroyed the old plant. Accompanying the descriptive matter in the other folders are statements regarding economies, especially in the buying of building materials, effected by the Chase company.

STEAM DRIVEN AIR COMPRESSORS.—The Chicago Pneumatic Tool Co., Chicago, has issued a bulletin describing and illustrating steam driven air compressors. The machines are of the horizontal, single stage, double fly-wheel type. The heavy duty main frame is completely inclosed. It is claimed that a system of bath lubrication for the main bearings, crosshead, crosshead guide, wrist pin and crank pin makes the compressor practically self oiling and relieves the engineer of the necessity of giving frequent attention to these parts of the machine. The steam compressor is designed for steam pressures ranging from 80 to 125 pounds and for air pressures up to 125 pounds. The connecting rods and crank-shafts are both forged. The valve is of the balanced flat side, double-ported type with an automatic cut-off. The governor consists of a weighted arm, a link and a heavy helical spring. Friction in the governor is said to be eliminated by the method of construction which places the inertia and centrifugal forces in opposition.

SAWING MACHINES.—The Newton Machine Tool Works, Philadelphia, Pa., has issued an attractive 72-page booklet describing its sawing machinery. In the catalog it is said that the company maintains a corps of representatives, trained in the shop and engineering departments, especially to visit the various plants and observe how machines of its manufacture behave under working conditions. The company makes machines with saw blades varying from 20 to 84 inches in diameter. Each type of sawing machine is illustrated in the booklet and complete dimensions are given. A few pages are devoted to descriptions of each separate part of the machine. Photographs of typical shop scenes in many plants including those of the Pittsburgh Crucible Steel Co., Pittsburgh; R. D. Nuttall Co., Pittsburgh; and Westinghouse Electric & Mfg. Co., East Pittsburgh, are reproduced. One photograph shows a 74,000-pound billet, 35 inches in diameter, being cut by an 84-inch saw. A portion of the bulletin is devoted to a description of locomotive rod boring machines, planing machines, horizontal rail drilling machines, milling and boring machines and other machinery of this type.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

Bessemer valley	$33.00 to 35.00
Bessemer, Pittsburgh	33.95 to 35.95
Basic, Pittsburgh	30.95
Basic, eastern Pa.	27.50 to 28.00
Basic, Buffalo	29.00 to 30.00
Malleable, Pittsburgh	30.95
Malleable foundry, Chicago	27.00 to 28.00
Malleable foundry, Philadelphia	29.00 to 30 00
Malleable foundry, Buffalo	29.00 to 30.00
No. 1X foundry, Philadelphia	28.50 to 29.00
No. 2 foundry, Pittsburgh	30.95
No. 2 foundry, Cleveland	30.30
No. 2 foundry, Ironton	26.00 to 27.00
No. 2 foundry, Chicago	27.00 to 28.00
No. 2X foundry, Philadelphia	27.50 to 28.50
No. 2X foundry, N. J. tidewater	27.50 to 28.50
No. 2X foundry, Buffalo	29.00 to 30.00
No. 2 plain, Philadelphia	27.00 to 27.50
No. 2 plain, N. J. tidewater	27.00 to 27.50
No. 2 plain, Buffalo	29.00 to 30.00
No. 2 southern, Birmingham	21.00 to 22.00
No. 2 southern, Cincinnati	23.90 to 24.90
No. 2 southern, Chicago	25.00 to 26.00
No. 2 southern, Phila. delivery	25.00 to 27.00
No. 2 southern, Cleveland	25.00 to 26.00
No. 2 southern, New York docks	25.25 to 27.25
No. 2 southern, Boston docks	25.00 to 27.00
No. 2 south. interior, New Eng.	26.00 to 28.00
No. 2 southern, St. Louis	**18.40 to 18.90**
Virginia No. 2X furnace	26.00 to 28.00
Virginia, No. 2X, Philadelphia	28.75 to 30.75
Virginia, No. 2X, Jersey City	29.00 to 31.00
Virginia 2X, Boston points	29.25 to 31.25
Gray forge, eastern Pa.	26.00 to 26.50
Gray forge, Pittsburgh	29.95
Gray forge, Birmingham	20.00
Silveries, 8 per cent, furnace	36.00 to 37.00
Silveries, 8 per cent, Chicago	34.50 to 37.50
Low phos. Standard, Phila.	49.00 to 50.00
Low phos. Lebanon, Pa., furnace	47.00 to 48.00
Low phos., Pittsburgh	43.00 to 45.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	26.75 to 28 75
Charcoal, Buffalo	24.00 to 27.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	$ 5.95
Mesabi Bessemer, 55 per cent, ton	5.70
Old range non-Bes., 51½ per cent, ton	5.20
Mesabi non-Bess., 51½ per cent, ton	5.05

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellsville furnace	$6.75 to 7.00
Connellsville fur., contract	**3.75 to 4.00**
Connellsville foundry, contract	6.25 to 6.75
Connellsville foundry	9.50 to 10.00
Wise county furnace, contract	5.00 to 5.50
Wise county foundry, contract	5.50 to 6.00
Pocahontas foundry, contract	5.50 to 6.00
Pocahontas furnace, contract	5.00 to 5.50
New River foundry, contract	5.75 to 6.25
New River furnace, contract	5.25 to 5.75

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, or delivered prompt	$163 to 165
Ferro manganese, 80 per cent, seaboard, or delivered, contract	163 to 165
Spiegel, 20 per cent, fur. early and last half	50.00 to 55.00
Ferro-silicon, 50 per cent, Pbg.	95.00 to 100.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $39.00 to $41.00; 10 to 11 per cent, $40.00 to $42.00; 11 to 12 per cent, $41.00 to $43.00; 12 to 13 per cent, $42.00 to $44.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$50.00 to 55.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal	75.00 to 85.00
Forging billets, Chicago	70.00
Wire rods, Pittsburgh (nom.)	65.00 to 70.00
Bessemer billets, Youngstown	55.00 to 60.00
Bessemer billets, Pittsburgh	55.00 to 60.00
Open hearth billets, Pittsburgh	55.00 to 60.00
Open hearth billets, Youngstown	55.00 to 60.00
Bess. sheet bars, Youngstown	55.00 to 60.00
Op. h'th sheet bars, Youngstown	55.00 to 60.00
Bess. sheet bars, Pittsburgh	55.00 to 60.00
Open hearth sheet bars, Pbgh.	55.00 to 60.00
Muck bars, Pittsburgh (nominal)	50.00

SKELP

Grooved steel skelp	3.00c
Sheared steel skelp	3.50c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$38.00
Stan. op-h'th rails, Pbg. & Chgo.	40.00
Light rails 8 to 10 lbs., Pbgh.	49.00
Light rails, 8 lb., Chicago	48.00
Light rails, 12 to 14 lbs., Pbgh.	48.00
Light rails, 12 lbs., Chicago	46.00
Light rails, 16 to 20 lbs., Pbgh.	47.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$45.00
Light rails, 25 to 45 lbs., Pbgh.	46.00
Light rails, 25 to 45 lbs., Chgo.	44.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c to 2.50c
Angle bars, st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	4.50c to 4.75c
Track bolts, Chicago	4.25c to 4.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh.	3.00c
Structural shapes, Pbgh	3.00c to 3.25c
Structural shapes, Philadelphia	3.159c to 3.409c
Structural shapes, Chicago	3.19c to 3.75c
Structural shapes, New York	3.169c to 3.419c
Tank plates, Chicago	3.69c to 4.25c
Tank plates, Pittsburgh (con.)	3.50c to 4.50c
Tank plates, Pittsburgh	4.00c to 4.50c
Tank plates, Philadelphia	3.659c to 4.159c
Tank plates, New York	3.669c to 4.169c
Bars, soft steel, Chicago	3.09c to 3.50c
Bars, soft steel, Pbgh (con.)	2.90c
Bars, soft steel, Pittsburgh	3.00c to 3.25c
Bars, soft steel, New York	3.169c
Bars, soft steel, Philadelphia	3.159c
Hoops, carloads, Pbgh. contr.	3.25c
Hoops, Pbgh.	4.00c to 4.25c
Bands, Pittsburgh	3.85c to 4.00c
Bands, Pittsburgh (contr.)	2.90c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chicago	2.65c to 2.75c
Bar iron, Philadelphia	2.659c to 2.759c
Bar iron, Cleveland	2.90c
Bar iron, New York	2.669c to 2.769c
Bar iron, Pittsburgh	2.90c to 3.00c
Hard steel bars, Chicago	2.70c to 2.75c

SHEETS

(In cents per pound.)
(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	3.80 to 4.30
22 to 24	3.85 to 4.35
25 and 26	3.90 to 4.40
27	3.95 to 4.45
28	4.00 to 4.50
29	4.05 to 4.55
30	4.15 to 4.65

TIN MILL BLACK.

Gage.	Bessemer.
15 and 16	3.80 to 4.30
17 to 21	3.85 to 4.35
22 to 24	3.90 to 4.40
25 to 27	3.95 to 4.45
28	4.00 to 4.50
29 and 30	4.05 to 4.55
30½ and 31	4.10 to 4.60

GALVANIZED.

Gage.	Bessemer.
10 and 11	4.50 to 5.00
12 to 14	4.60 to 5.10
15 and 16	4.75 to 5.25
17 to 21	4.90 to 5.40
22 to 24	5.05 to 5.55
25 and 26	5.20 to 5.70
27	5.35 to 5.85
28	5.50 to 6.00
29	5.70 to 6.20
30	5.90 to 6.40

BLUE ANNEALED.

Gage.	Bessemer.
3 to 8	3.65 to 4.15
9 to 10	3.50 to 4.00
11 to 12	3.50 to 4.00
13 and 14	3.60 to 4.10
15 and 16	3.65 to 4.15

No. 28 black, Chicago	4.19c to 4.44c
No. 28 galvanized, Chicago	5.19c
No. 10 blue annealed, Phila.	3.409c to 3.659c
No. 10, blue annealed, Chgo.	3.69c to 3.94c

TIN PLATE

Tin plate, 100 lb., coke base	6.50c to 7.00c
Terne plate	5.75c

IRON AND STEEL PIPE

(Prices adopted Nov. 15, 1916.)

Steel.	Black.	Galv.
Butt weld:—		
⅛, ¼ and ⅜ in.	61	34½
½ in.	65	50½
¾ to 3 in.	68	54½
Lap weld:—		
2 in.	61	48½
2½ to 6 in.	64	51½
7 to 12 in.	61	47½
13 and 14 in.	51½	....
15 in.	49	....

Iron.	Black.	Galv.
Butt weld:—		
⅛ and ¼ in.	46	18
⅜ in.	47	19
½ in.	51	32
¾ to 1½ in.	54	37
Lap weld:—		
1¼ in.	40	24
1½ in.	46	31
2 in.	47	32
2½ to 6 in.	49	35
7 to 12 in.	48	34

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	46
Iron 3½ to 4½ inches l. c. l.	36

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Adopted Nov. 24, 1916.)
(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$3.00
Plain wire, jobbers', Pittsburgh	2.95
Galvanized wire, jobbers', Pbgh	3.65
Polished staples, Pbgh	3.15
Galvanized staples, Pbgh	3.85
Barb wire, painted, jobbers', Pbgh.	3.15
Barb wire, galv., jobbers', Pbgh	3.85

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50; cut threads, 40, 7 and ½, larger or longer, 35.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50, and 5; cut, 40, 10 and 5; larger or longer, 40.

Cold pressed, semi-finished hexagon nuts, 60.

Gimlet and cone point lag bolts, 50. Hot pressed square nuts, blanks, $2.60 off; tapped $2.40 off. Hot pressed hexagon nuts, blank, $2.60 off; tapped, $2.40 off.

Cold pressed square nuts, blank, $2.20 off; tapped, $2.00 off. Cold pressed hexagon nut, blank, $2.50 off; tapped, $2.25 off.

RIVETS

Structural rivets, Pbgh	4.25c
Boiler rivets, Pbgh	4.35c

Tinner's rivets, 45, and 10 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	3.00c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.50c

COLD ROLLED STRIP STEEL

Base price 6.50c to 7.00c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$42.00 to 43.00
Six-inch and larger, Chicago	39.00 to 40.00
Six-inch Class B, New York	37.50
Four-inch Class B, New York	40.50
Four to six-inch Birmingham	31.50
Six-inch and larger, Birmingham	28.50

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.60c
Steel squares, 2-in. & ov., Cleve.	4.25c
Steel rounds, 2-in. & ov., Cleve.	4.25c
Steel bars, und. 2 in., Cleveland	3.75c
Steel bars, Detroit	3.35c
Steel bars, Philadelphia	3.50c
Steel bars, New York	3.75c
Steel bars, St. Louis	3.55c
Steel bars, Cincinnati	3.70c to 4.25c
Steel bars, St. Paul	3.70c
Steel bars, over 2-in., Buffalo	4.40c
Steel bars, Buffalo	3.75c
Iron bars, Chicago	3.60c
Iron bars, Cleveland	3.70c
Iron bars, Detroit	3.35c
Iron bars, St. Louis	3.30c to 3.35c
Iron bars, Cincinnati	3.70c to 4.25c
Iron bars, Philadelphia	3.50c
Iron bars, New York	3.75c
Shapes, Chicago	3.70c
Shapes, Detroit	3.45c
Shapes, St. Louis	3.75c
Shapes, St. Paul	3.80c
Shapes, New York	3.75c
Shapes, Cleveland	3.85c
Shapes, Philadelphia	3.50c
Shapes, Buffalo	3.85c
Shapes and plates, Cincinnati	3.80c to 4.35c
Plates, Chicago	4.35c
Plates, Detroit	4.10c
Plates, St. Louis	4.40c
Plates, St. Paul	4.45c
Plates, New York, wide	5.00c
Plates, New York, narrow	4.75c
Plates, Cleveland	4.35c
Plates, Philadelphia	4.25c to 4.75c
No. 10 blue anl. sheets, Chicago	4.00c
No. 10 blue anl. sheets, Cleve.	4.15c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	4.05c
No. 10 blue anl. sheets, Cinci.	4.15c
No. 10 blue anl. sheets, St. Paul	4.15c
No. 10 blue anl. sheets, Detroit	3.80c
No. 28 black sheets, Chicago	4.60c
No. 28 black sheets, Cleveland	4.50c
No. 28 black sheets, Cincinnati	4.15c
No. 28 black sheets, Detroit	4.10c
No. 28 black sheets, St. Louis	4.65c
No. 28 black sheets, St. Paul	4.75c
No. 28 galv. sheets, Chicago	6.50c
No. 28 galv. sheets, Cleveland	6.00c
No. 28 galv. sheets, Cincinnati	5.75c
No. 28 galv. sheets, Detroit	5.50c
No. 28 galv. sheets, St. Louis	5.75c to 5.95c
Hoops, Cleveland	4.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$26.00 to 27.00
Angle bars, steel, St. Louis	19.50 to 20.00
Arch bars and transoms, Chgo.	29.00 to 29.50
Arch bars and transoms, St. L.	26.00 to 27.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	14.00 to 14.50
Boiler punchings, Chicago	18.00 to 19.00
Bundled sheet, Cincinnati	10.00 to 10.50
Busheling, No. 1, Chicago	18.25 to 18.50
Busheling, No. 1, Cincinnati	14.00 to 14.50
Busheling, No. 1, Cleveland	18.50 to 19.00
Busheling, No. 1, St. Louis	18.00 to 18.50
Busheling, No. 2, Chicago	13.00 to 13.50
Cast borings, Chicago	8.25 to 8.50
Cast borings, Cincinnati	8.00 to 8.50
Cast borings, Cleveland	10.50 to 10.75
Cast borings, St. Louis	9.50 to 10.00
Cast, No. 1, Chicago	16.00 to 16.50
Cast, No. 1, Cincinnati	14.50 to 15.00
Cast, No. 1, Cleveland	18.00 to 19.00
Cast, No. 1, St. Louis	15.00 to 16.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	22.00 to 23.00
Iron axles, St. Louis	33.50 to 34.00
Iron axles, Cleve	40.00
Knuckles, coup., Chicago	23.00 to 23.50
Knuckles, coup., St. Louis	22.50 to 23.00
Locomotive tires, Chicago	28.50 to 29.00
Locomotive tires, St. Louis	25.50 to 26.00
Machine shop turnings, Chicago	8.75 to 9.25
Machine shop turnings, Cleve.	9.25 to 9.75
Machine shop turn'gs, Cincinnati	8.50 to 9.00
Machine shop turnings, St. L.	10.00 to 10.50
Malleable agricultural, Chgo	14.50 to 15.00
Malleable agricultural, St. Louis	14.50 to 15.00
Malleable, Cincinnati	10.00 to 10.50
Malleable railroad, Chicago	17.25 to 17.75
Malleable railroad, St. Louis	15.50 to 16.00
Pipes and flues, Cleveland	16.00 to 16.50
Pipes and flues, Chgo	16.00 to 16.50
Pipes and flues, St. Louis	15.50 to 16.00
Railroad wrought, No. 1, Cleve.	23.50 to 24.50
Railroad wrought, No. 1, Chgo.	24.00 to 25.00
Railroad wrought, No. 1, Cinci.	17.00 to 17.50
Railroad wrought, No. 1, St. L.	21.50 to 22.00
Railroad wrought, No. 2, Chgo.	23.00 to 24.00
Railroad wrought, No. 2, St. L.	20.50 to 21.00
Shafting, St. Louis	25.00 to 26.00
Springs, Chicago	23.00 to 23.50
Steel car axles, St. Louis	36.00 to 36.50
Steel car axles, Chicago	38.00 to 38.50
Stove plate, Chicago	11.25 to 11.75
Stove plate, Cleveland	14.25 to 14.50
Stove plate, Cincinnati	10.00 to 10.50
Stove plates, St. Louis	14.00 to 14.50

(Gross tons.)

Axle turnings, Cleveland	$15.00 to 15.50
Busheling, No. 1, Buffalo	18.50 to 19.00
Busheling No. 1, Pittsburgh	18.50 to 19.00
Busheling, No. 2, Buffalo	14.00 to 14.50
Bundled sheets, Pittsburgh	13.00 to 13.50
Bundled sheets, Cleveland	14.00 to 14.50
Bundled sheets, Buffalo	14.50 to 15.00
Bundled tin, Buffalo	13.50 to 14.00
Car wheels, (iron), Pittsburgh	20.00 to 20.50
Car wheels, (steel), Pittsburgh	25.00 to 26.00
Car wheels, Chicago	17.50 to 18.00
Car wheels, eastern Pa	21.00 to 22.00
Car wheels, Buffalo	19.50 to 20.00
Car wheels, New York	19.00 to 20.00
Car wheels, St. Louis	17.50 to 18.00
Car wheels, Birmingham	14.00 to 15.00
Tram car wheels, Birmingham	13.00 to 14.00
Cast borings, New York	10.00 to 11.00
Cast borings, eastern Pa	12.50 to 13.00
Cast borings, Buffalo	10.00 to 10.50
Cast borings, Pittsburgh	12.00
Cast, No. 1, eastern Pa	20.00 to 21.00
Cast, No. 1, Pittsburgh	17.00 to 18.00
Cast, No. 1, Birmingham	16.00 to 17.00
Cast, heavy No. 1, N. J. points	17.75 to 18.00
Forge, No. 1, eastern Pa	15.50 to 16.50
Frogs, switches, guards, St. L.	21.50 to 22.00
Grate bars, Buffalo	14.50 to 15.00
Grate bars, Cleveland	14.50
Grate bars, N. J. points	13.50 to 14.00
Heavy axle turnings, Buffalo	15.00 to 15.50
Heavy melting steel, Pittsburgh	22.75 to 23.50
Heavy melting steel, Buffalo	21.50 to 22.00
Heavy melting steel, Chicago	22.00 to 22.50
Heavy melting steel, Cleveland	22.00 to 22.50
Heavy melting steel, Cincinnati	20.50 to 21.00
Heavy melting steel, eastern Pa.	23.00 to 24.00
Heavy melting steel, New York	21.00 to 22.00
Heavy melting steel, St. L	22.50 to 23.00
Heavy melting steel, Birmingham	17.00 to 18.00
Hydraulic pressed sheet, Cleve	17.00 to 17.50
Hydraulic pressed sheets, Pbgh	18.50 to 19.25
Iron rails, Chicago	27.50 to 28.00
Iron rails, Buffalo	21.50 to 22.00
Iron rails, Cincinnati	20.50 to 21.00
Iron rails, St. Louis	23.50 to 24.00
Iron rails, Cleveland	29.00 to 30.00
Iron axles, Pittsburgh	38.00 to 40.00
Iron axles, Cincinnati	29.00 to 30.00
Iron axles, eastern Pa	38.00 to 40.00
Iron axles, Chicago	42.00 to 42.50
Iron axles, Buffalo	35.00
Low phos. steel, Buffalo	27.50 to 28.00
Low phos. steel, Pittsburgh	29.00 to 30.00
Low phos. steel, eastern Pa	31.00 to 33.00
Machine shop turnings, Buffalo	10.00 to 10.50
Mch. shop turnings, New York	10.00 to 10.50
Mch. shop turnings, Pittsburgh	11.75 to 12.00
Mch. shop turnings, eastern Pa	12.00 to 12.50
Mch. shop turnings, Birmingham	7.00 to 7.50
Malleable railroad, Cleveland	21.00
Malleable railroad, Buffalo	18.50 to 19.00
Malleable railroad, Pittsburgh	20.50 to 21.00
Malleable railroad, eastern Pa	17.00 to 18.00
R. R. car wheels, Cleve	21.00 to 22.00
R. R. and mch. cast, No. 1 Bfl.	19.50 to 20.00
R. R. wrought, No. 1, Buffalo	25.00 to 26.00
R. R. wrgt., No. 1, eastern Pa.	25.00 to 26.00
City wrought, New York	17.00 to 17.50
R. R. wrought, No. 1, Pbgh	24.50 to 25.50
R. R. wrought, No. 1, B'ham	16.00 to 17.00
Reroll. rails, 5 ft. and ov., Pbg.	25.00 to 27.00
Reroll. rails, 5 ft. & ov., Chgo.	27.00 to 27.50
Reroll. rails, 5 ft. & ov., E. Pa.	26.00 to 27.00
Reroll. rails, 5 ft. & ov., St. L.	23.50 to 26.00
Shafting, New York	25.00 to 26.00
Shafting eastern Pa	27.00 to 28.00
Shoveling steel, Chgo	20.00 to 20.50
Shoveling steel, St. Louis	20.00 to 20.50
Steel rails, short, Chicago	23.00 to 24.00
Steel rails, short, Cleveland	27.00 to 27.50
Steel rails, over 6 ft. Cleveland	25.00 to 26.00
Steel rails, old, Birmingham	17.00 to 18.00
Steel rails, short, St. Louis	21.50 to 22.00
Steel car axles, Birmingham	26.00 to 27.00
Steel car axles, New York	38.00 to 40.00
Steel car axles, Buffalo	35.00
Steel car axles, Cleveland	44.00
Steel car axles, Pittsburgh	38.00 to 40.00
Steel car axles, eastern Pa	38.00 to 40.00
Stove plate, N. J. points	14.00 to 14.50
Stove plate, Birmingham	12.00 to 13.00
Stove plate, Buffalo	14.50 to 15.00
Stove plate, eastern Pa	16.50 to 17.50
Stove plate, Pittsburgh	13.00 to 13.50
Wrought pipe, Buffalo	15.50 to 16.00
Wrought pipe, eastern Pa	18.00 to 18.50
Wrought pipe, New York	16.00 to 16.50

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United Engrg. & Foundry Co., Pittsburgh, Pa.
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BALE TIES.
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BALLS.
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New Departure Mfg. Co., Bristol, Conn.

BANDS.
(Steel.)
Akron-Selle Co., The, Akron, O.
Carnegie Steel Co., Pittsburgh, Pa.

BARGES.
(Steel.)
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BARRELS, TUMBLING.
(Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS.
(Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS.
(Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
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Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
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Ryerson, Joseph T., & Son, Chicago, Ill.
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Standard Gauge Steel Co., Beaver Falls, Pa.
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Trussed Concrete Steel Co., Detroit, Mich.
United Alloys Steel Corp., The, Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BEAMS, CHANNELS AND ANGLES.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Empire Art Metal Co., College Pt., N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS.
(Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS.
(Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING.
(Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING.
(Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES.
(Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES.
(Drawing.)
Morgan Construction Co., Worcester, Mass.
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Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL, RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BESSEMER SQUARES.
(Soft.)
Witherow Steel Co., Pittsburgh, Pa.

BILLETS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BINS.
(Steel.)
Empire Art Metal Co., College Pt., N. Y.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS.
(Chain.)
Yale & Towne Mfg. Co., New York City.

BLOOMS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

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